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THE
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⁂

1900
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—OF—

THE AMERICAN WELL WORKS

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OUR ENCYCLOPEDIA

is too well known to need introduction, further than to commend it to your careful consideration. It contains illustrations, descriptions and prices of machinery demonstrated to be the most practical, including Well Sinking, Prospecting, Pumping, Irrigating and Hoisting Machinery; Water Hoists, Chapmans' Air Water Lifting Systems, Gasoline, Gas, and Steam Engines, Boilers, etc., all of our own Manufacture.

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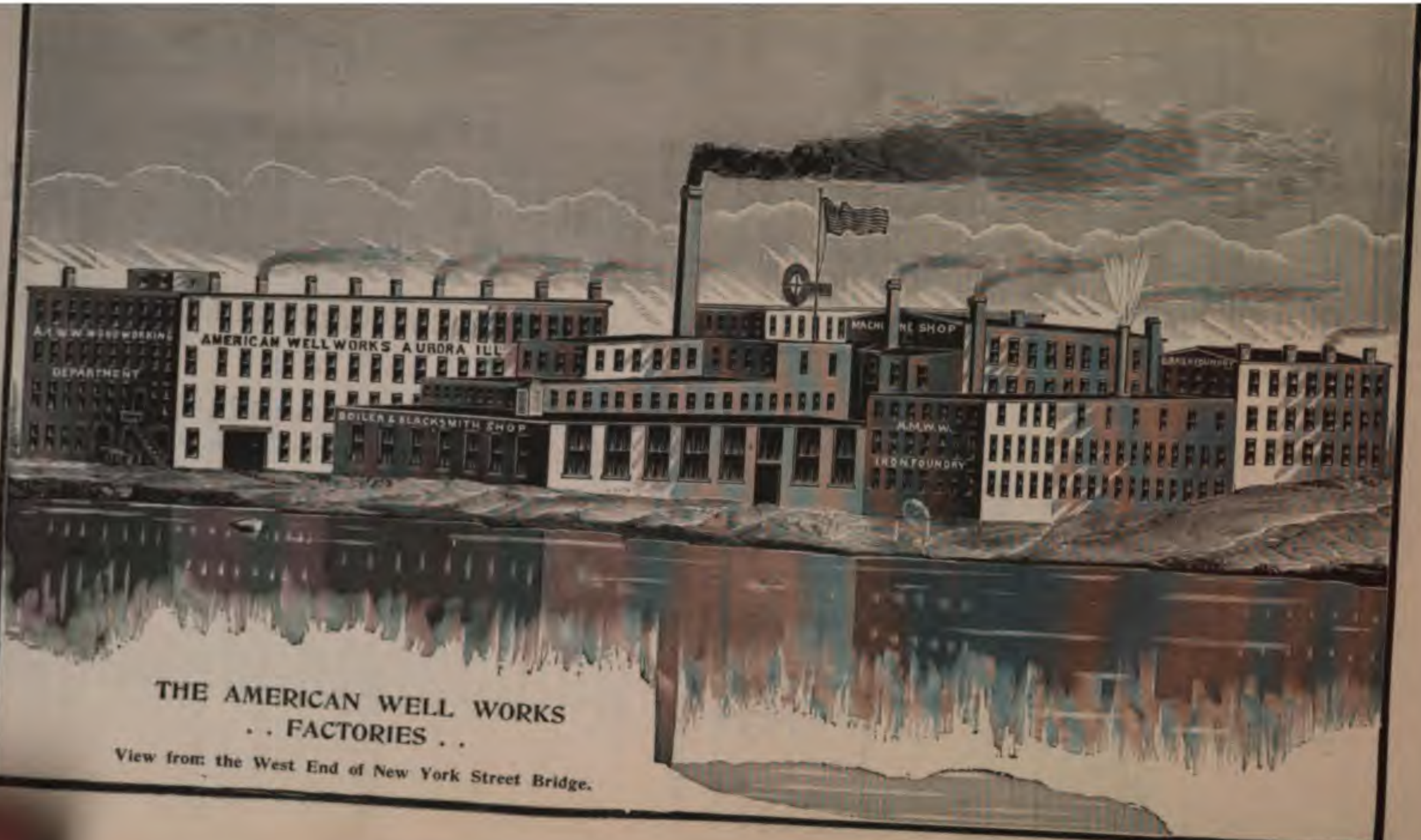

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Abare	At what price will you sell
Abcor	When can you furnish
Abder	About when will you ship order

ANSWERS.

Abeal	We will furnish (at)
Abfet	We quote ....% discount (on)
Abgot	Are hurrying your order
Abhul	Will ship
Abiot	Will ship about
Abjob	Ship............ best can do
Abkom	Your order shipped by express
Ablep	Your order shipped by freight

GENERAL

Abmut	See our letter (of)
Abnop	We have entered order (for)
Aboot	Will accept order (at)
Abpos	Prices have advanced
Abqui	Prices have declined
Abrot	Send shipping instructions
Absed	Wire answer
Abtup	Not later than
Abutt	Urgently needed for repairs
Abvol	Will reduce price
Abwis	Must advance price
Abyit	Freight expense approximately
Abzoz	Are quoted freight rate (of)
Acbot	Freight allowed (to)
Accox	We are tracing
Acdax	If ordered immediately
Aceep	If order wired

ORDERS.

Acfut	Ship by freight
Acgad	Ship by express

DELIVERY.

Aciel	F. O. B. cars
Acjay	F. O. B. cars factory

TERMS.

Ackok	Cash with order
Aclol	Half with order balance C. O. D.
Acmoi	Collect on delivery
Acneu	Remittance on receipt shipping papers
Acoos	Thirty days
Acpop	Sixty days
Acqui	Cash Disct. Paymt. within 10 days

NUMBER (OR QUANTITY) DOLLARS, PER. CENT. DISCT., DETERMINED BY WORDING OF TELEGRAM.

INTERMEDIATE NUMBERS MADE UP CUMULATIVELY.

1	Acvor	30	Adzuc	57½	Agpoz	87	Ajnec
2	Acses	31	Afbac	58	Agrex	88	Ajpip
3	Actat	32	Afcot	59	Agsub	89	Ajrin
4	Acual	32½	Afdeb	60	Agtip	90	Ajsid
5	Acvav	33	Afelt	61	Agves	91	Ajtoc
6	Acwow	33⅓	Affot	62	Agwip	92	Ajvim
7	Acxil	34	Afgip	62½	Agzoy	93	Ajwin
7½	Acyot	35	Afhuz	63	Ahbax	94	Ajyid
8	Aczoz	36	Afiet	64	Ahcea	95	Ajzaz
9	Aczup	37	Afjug	65	Ahdec	96	Akbao
10	Adabo	37½	Afkap	66	Ahfat	97	Akcab
11	Adbel	38	Aflob	67	Ahgot	98	Akdec
12	Adcut	39	Afmut	67½	Ahhit	99	Akfib
12½	Adduc	40	Afnex	68	Ahjig	100	Akgud
13	Adeup	41	Afoiz	69	Ahkuc	200	Akhon
14	Adful	42	Afpus	70	Ahlic	300	Akjug
15	Adgob	42½	Afrib	71	Ahmoc	400	Akkok
16	Adhol	43	Afsot	72	Ahnup	500	Aklib
17	Adiox	44	Aftuc	72½	Ahpic	600	Akmid
17½	Adjot	45	Afvop	73	Ahred	700	Aknob
18	Adkok	46	Afwep	74	Ahsib	800	Akpux
19	Adlol	47	Afyen	75	Ahtec	900	Akred
20	Admus	47½	Afzux	76	Ahvod	1000	Aksyz
21	Adnes	48	Agbot	77	Ahwup	2000	Aktoo
22	Adoop	49	Agcos	77½	Ahyep	3000	Akvee
22½	Adpop	50	Agdud	78	Ahzix	4000	Akwil
23	Adque	51	Agfes	79	Ajaps	5000	Akyec
24	Adrot	52	Aggub	80	Ajdab	6000	Akzil
25	Adsux	52½	Aghab	81	Ajfel	7000	Aland
26	Adtot	53	Agjat	82	Ajhop	8000	Albad
27	Aduam	54	Agkel	83	Ajjaj	9000	Alcab
27½	Advet	55	Agloc	84	Ajkuc	10000	Aldic
28	Adwon	56	Agmeu	85	Ajlet		
29	Adyip	57	Agnon	86	Ajmux		

Suggestions to Correspondents.

1st. Write PLAINLY your NAME, POST OFFICE, COUNTY and STATE.

2nd. When asking quotations on well machinery, give:

Figure Number.
Size Outfit desired.
Size Pipe will Use.
Depth May Go.
Formations.
Steam or Horse.
Mounted or Unmounted.
Whether Complete Outfit.
Extra Tools Desired.

(Steam Engines do not get tired, and are better than horses—especially true in deep holes of 500 feet or more. Outfits made on order for both horse and steam power combined, or to be run by your farm engines.)

3rd. When asking prices on STEAM, WIND, or HAND, COMMON and FORCE PUMPS state kind (give Fig. No.) and size wanted; if you cannot do this, state:

Steam, Horse, Wind or Hand
Quantity per Hour Desired.
Depth of Well.
Diameter of Well.
Kind of Well.
Natural Water Level in Well.
Height Water to be Forced Above Pump.
Distance of Tank from Pump.

4th. Most of the prices contained in this ENCYCLOPŒDIA are subject to discount. Write for quotations.

5th. All quotations are for cash payments unless otherwise agreed.

6th. Clerical or typographical errors are subject to correction in all cases.

HOW TO ORDER.

1. **Make your order clear and complete.**
2. **Read order after writing to avoid mistakes.**
3. **Order on separate sheet of paper.**
4. **Always give publication, page and Fig. Number.**
5. **Make order show exactly what you want on its face.**
6. **We decline responsibility for mistakes from references to previous orders, or from leaving us to guess what you want.**
7. **Goods will not be shipped C. O. D. to strangers save on cash deposit to secure all charges.**
8. **Cash must accompany order for all special and fishing tools.**
9. **If prices unknown, remit to cover and direct return of change.**
10. **Always sign partnership orders alike: Example—Brown & Smith, by John Smith.**

REMITTANCES.

1. **Remit by Chicago, New York or St. Louis draft, P. O. or Express Money Order, by Express or Registered Letter.**
2. **Do not send local checks unless you add 25c. for exchange. Banks will not take them at par.**

THE AMERICAN WELL WORKS,
AURORA, ILL., CHICAGO, ILL., DALLAS, TEX., U. S. A.

Information Required for Well Pumping Machinery Estimates.

Answer every applicable question. If uncertain.so state. and state as near as may be, or giv your opinion. If more than one well, give dimensions, distances and quantities for each separat Careful answers save you money by securing best plant for the particular work, **A sketch of locations, elevations and distances will aid.**

1.	Depth of well in feet	
2.	Inside diameter of well from surface down to ______ feet is	
	" " " " " that depth down to ______ feet is	
	" " " " " last " " " ______ feet "	
3.	Is well properly cased to bottom? If not, explain fully	
4.	Has well proper screen? If not, why?	
5.	Does well flow? If yes, how many gallons per Min.?	
6.	How many feet to water when not pumping?	
7.	State largest number gallons per minute ever pumped from well	
8.	To what depth below surface did that pumping lower water?	
9.	For how many gallons per minute shall we calculate plant?	
10.	Will less quantity answer? If yes, state gallons per Min.	
11.	If well will not furnish quantity, will you sink others?	
12.	If water is to be elevated above well, state how high	
13.	If elevated tank not over well, state feet distant	
14.	If pipe already laid from well to tank, state diameter	
15.	State number of elbows, globe and check valves in this pipe line	
16.	Is it convenient to deliver at surface, then pump to elevation?	
17.	State boiler steam pressure	
18.	Have yon ample steam supply?	
19.	How many feet will pump or compressor be from boiler?	
20.	How many feet will compressor be from well?	
21.	What floor space can you allow for compressor, or pump?	
22.	Do you prefer horizontal or vertical compressor?	
23.	Do you prefer air lift, deep well steam pump, or power pump?	
24.	For what purpose is water to be used?	
25.	Are you prepared to do the piping?	
26.	What is cost and kind of fuel?	

Name ______________________

Post Office ______________________

______________________ 189 ____ State ______________________

Conditions of Sales and Contracts.

1. This ENCYCLOPEDIA supersedes all previous issues and circulars.
2. All **QUOTATIONS** are for warehouse delivery unless otherwise stated.
3. All **QUOTATIONS** are for cash payments unless otherwise agreed.
4. **CLERICAL** or **TYPOGRAPHICAL ERRORS** are subject to correction in all cases.
5. Our **RESPONSIBILITY CEASES** when goods are delivered to carrier, and your recourse is on the carrier.
6. No claim allowed unless made within ten days from receipt of goods.
7. No **INSURANCE** placed on shipments unless arranged for previously.
8. Local **REPAIR BILLS** incurred without written authority will not be allowed.
9. **SPECIAL GOODS** and goods seldom called for, made on orders, cannot be exchanged.
10. **RETURN NO GOODS** without previously arranging therefor.
11. **ALL QUOTATIONS** and **PRICES** made by any officer or duly authorized representative of this company, acting through or for its general office situated at Aurora, Illinois, or through or for its Chicago House situated at Chicago, Illinois, **are made subject to final acceptance in Aurora or Chicago** as the case may be, of orders made thereon, or contracts resulting therefrom, and **such orders and contracts are contracts of the State of Illinois.**

    And likewise, all quotations and prices made by any officer or duly authorized representative of this company, acting through or for its Dallas House, situated at Dallas, Texas, **are made subject to the final acceptance in Dallas** of orders made thereon or contracts resulting therefrom and such orders and contracts **are contracts of the State of Texas.**
12. **ALL CONTRACTS** arranged or drawn in any state **other than the State of Illinois,** by any officer or representative of this company, acting through or for its general office situated at Aurora, Illinois, or its House situated at Chicago, Illinois, are subject to final acceptance at Aurora or Chicago, Illinois, as the case may be, **and are contracts of the State of Illinois.**

    And all contracts for contract work arranged or drawn in any other state than the State of Texas, by any officer or representative of this company, acting through or for its Dallas, Texas House, **are subject to final acceptance at Dallas, Texas, and are contracts of the State of Texas.**

Guarantee.

We guarantee the machinery of our manufacture, to be of suitable material, made in a thorough workman-like manner, and that when properly operated is suitable for the purposes represented by us. If, on receipt of goods, you find any piece to have been defective when shipped, we will replace free of charge on return by freight of piece defective, as claimed.

SERVICES OF EXPERTS.

IN pricing outfits, we never include any amount for expert service. Those who understand well sinking do not want to pay for any prospective service.

To parties, who wish to obtain a better knowledge of the science of deep well sinking and who desire instructions and assistance in sinking one well, we will send an Expert from the House to give such instruction and assistance upon the following terms and conditions:

1st. The party ordering Expert shall provide the necessary assistants, tools and material for making the well.

2nd. The party ordering Expert shall provide board and lodging for Expert and shall pay us for his time from the time of starting until return to the House, together with fare and necessary expenses on the road

3rd. A sufficient sum to cover fare, time and expenses of Expert one way must invariably *be advanced with order for man.*

4th. Where Experts are sent on extended jobs of contract work, or of prospecting, settlement and payment shall be made on the first day of each month for the preceding month.

5th. Time of Experts varies with the men and nature of work to be done, from $5.00 to $3.50 per day.

6th. We pick our Experts as the best and they are instructed to give you the best possible service. You are expected to follow Expert's advice in matters appurtaining to the science of well sinking, or send him home. If you think Expert fails at any time to fulfill the purpose for which he is sent, don't keep him longer. Or, if you and he fail to agree, or if you are dissatisfied in any manner whatever, send us full statement of the matter countersigned by Expert, and we will take prompt action as circumstances may require. Our purpose is to give the best service in every instance, and to please our patrons.

. . TERMS OF DAY WORK . .

To those desiring day work done we make the following scale of prices:

One man, no tools,	$5.00	per day.
One man and helper,	7.50	" "
One man and machine for sinking 2 & 3 in. wells, 300 feet or less, (no horses)	10.00	" "
One man and machine for wells to 500 feet (no horses)	12.50	" "
Steam Rig & tools for wells not deeper than 1000 feet, with two men,	25.00	" "
Steam Rig & tools for wells from 1000 to 2000 feet with two men,	30.00	" "

[These prices are net and supersede all previous lists, and are subject to change without notice.]

Time of men will be charged from the time they leave the House until they return. Time of outfits commences at the time of removing from railroad station and continues until outfit is re-shipped.

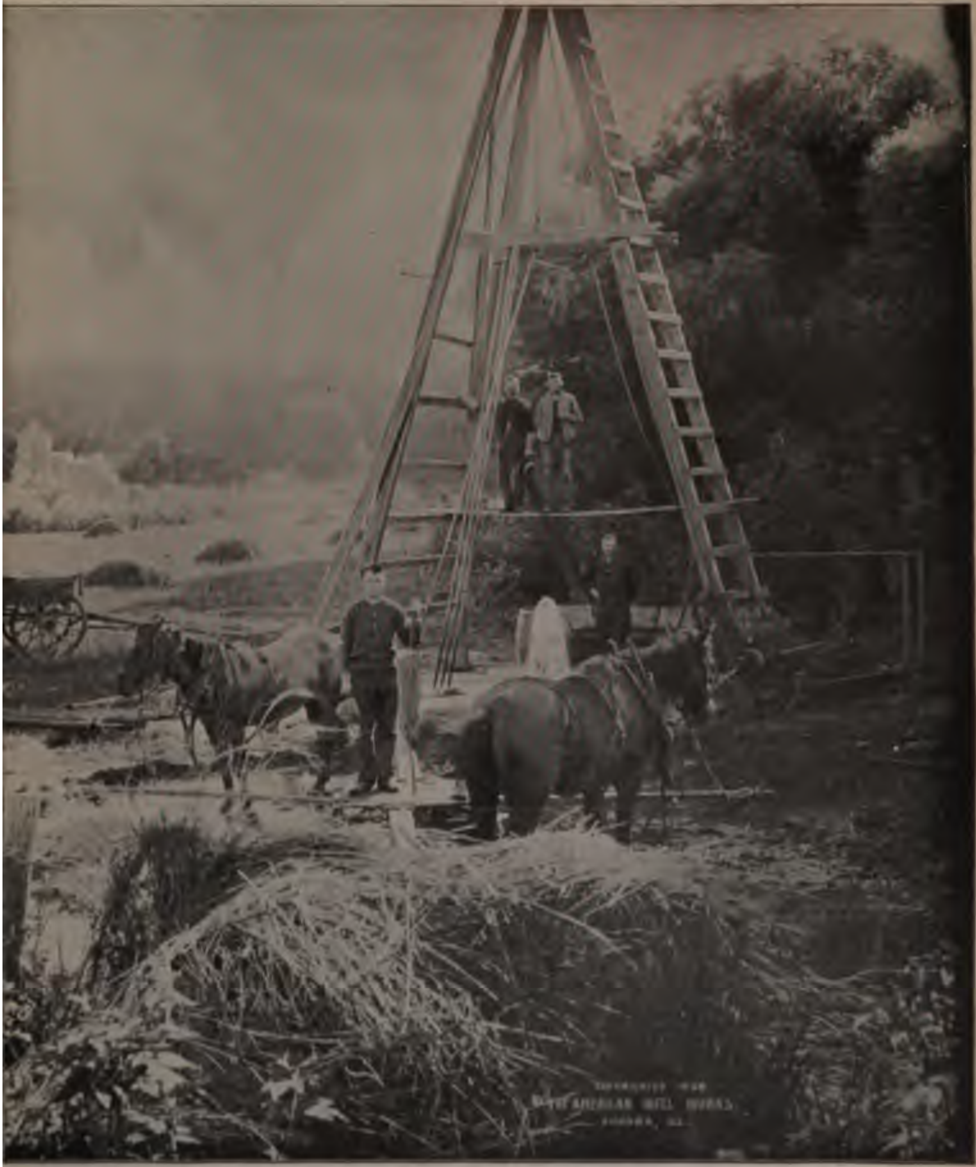
Transportation of machinery and tools, and fare and travelling expenses of men must be paid in advance.

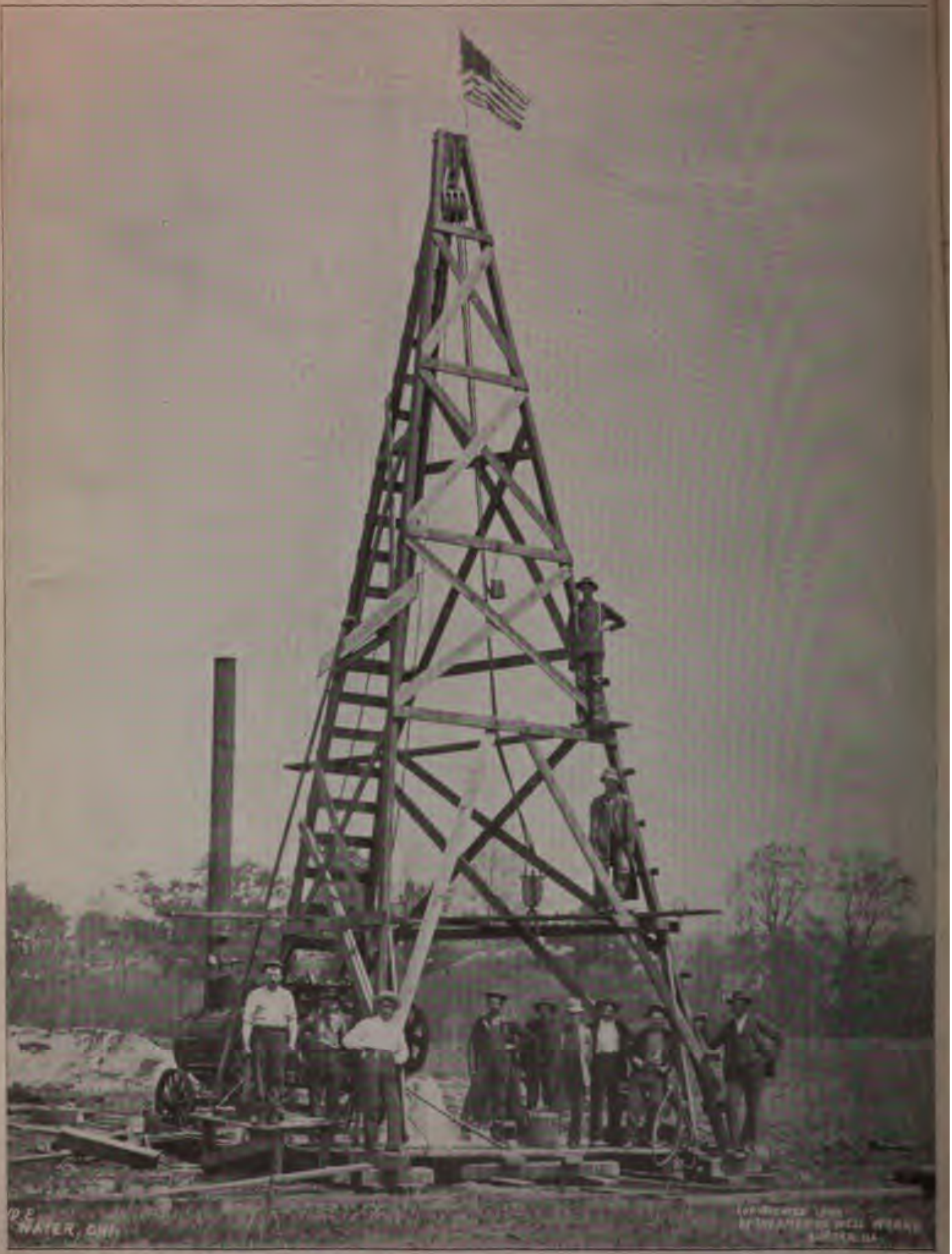
. . CONTRACT WORK . .

We will take contracts for sinking wells and prospect holes of any desired diameter to any reasonable depth in any country in the world.

We have had a very extended experience in putting in Railroad, City and Government Water Works, and the officers of the Company are Practical Well Sinkers and Engineers in this line.

State your needs, **and we will make you estimates.**


COPYRIGHT
THE AMERICAN WELL WORKS,
AURORA, ILL.



30 6 IN. 90 FT. WELLS, 90 DAYS. DELAYS AND MOVING INCLUDED.

On the previous pages we have given a few testimonials. The originals are on file in our office, together with many others, which we will show you, or give you a certified copy of any, with a notary's seal attached, should you desire it before purchasing.

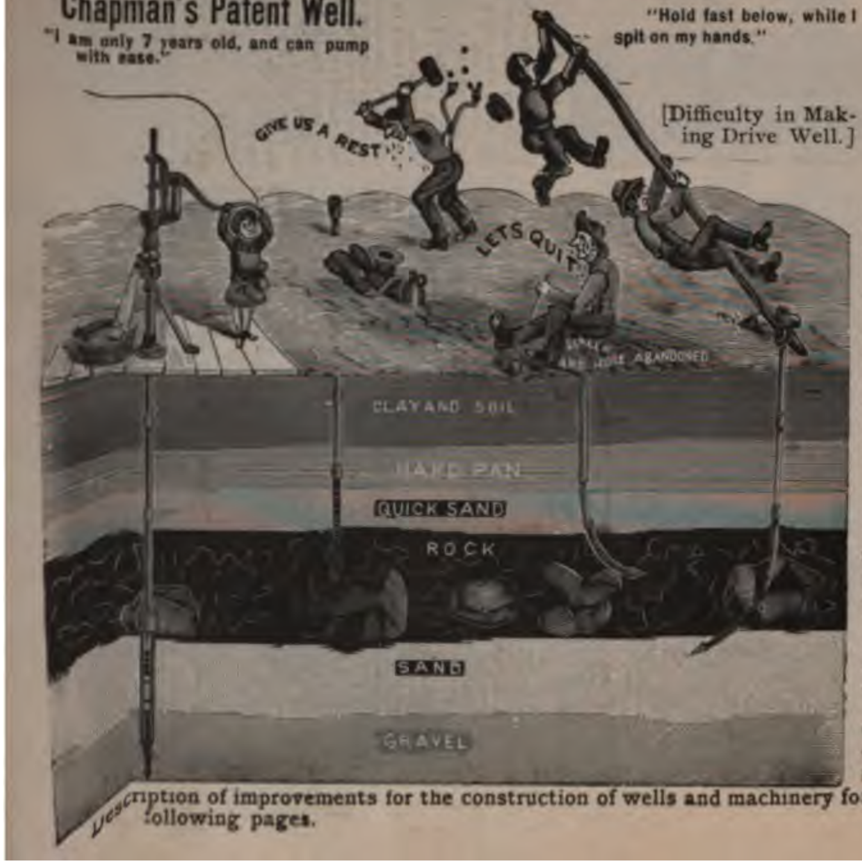
PROGRESS IN WELL MAKING

Chapman's Patent Well.

"I am only 7 years old, and can pump with ease."

"Hold fast below, while I spit on my hands."

[Difficulty in Making Drive Well.]



DESCRIPTION OF

THE CHAPMAN HYDRAULIC WELLS.

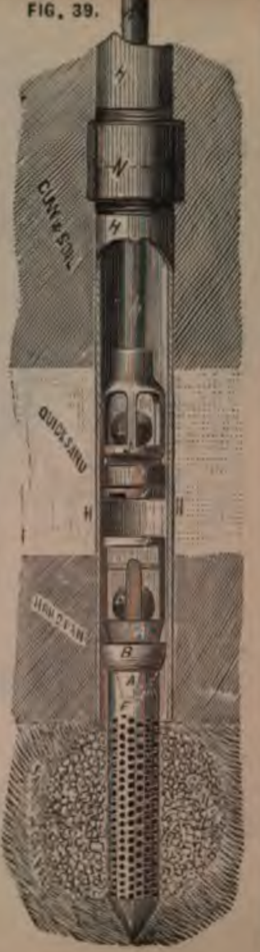
* * FIG. 39. * *

The Chapman Well consists of a heavy wrought iron tubing, having an approximate smooth inside surface, screwed together in sections, making one continuous cylinder from the top to the bottom, and is sunk into the ground; the outside of the tubing forms the wall of the well, and the inside the working barrel of the pump. We use a polished steel working barrel, bored true and smooth, for the plunger to work in. It may be put on the bottom of the line of pipe to give greater strength, to prevent the tube from bending in passing through boulders and such like substance, or may be used up the pipe between the sections.

When water is reached, the screen, or filter, with a sufficient length of pipe, is placed into the water strata, the upper end of the strainer tube extends up into the main tube, the check valve is dropped onto the upper end of the strainer tube, and forms a tight joint with the main tube and screen, thereby excluding all organic matter from the tubing; the plunger or pump bucket, is new attached to the plunger rods (the lengths of which screw together) and put into the well, the pump head is attached, and all is ready for work.

This is the only practical well to use in miasmatic districts, alkali regions, blue clay and quicksand countries, and all places where a constant supply of good, pure water is wanted.

FIG. 39.



Description of improvements for the construction of wells and machinery for sinking, will be found on the following pages.

Imaginary Ground Section of Chapmans' Patent Hydraulic Tube Well.

SHOWING AN IMPROVED METHOD FOR SINKING WELLS.

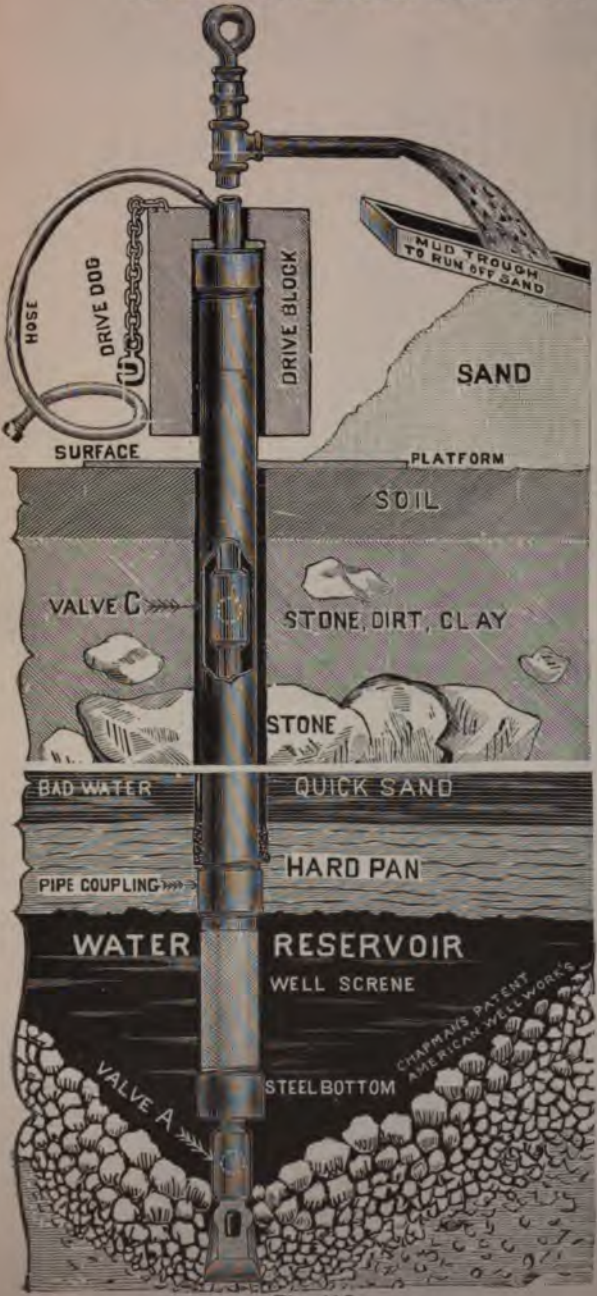


Fig. 116.

By the Hydraulic Drilling Process, the borings are pumped from the bottom of the hole to the surface of the ground. As the well is being sunk, necessary water is poured in, or the seep water in the well may be used. If water is scarce, it is run into pits on the top, allowed to settle, and may be used repeatedly.

PRINCIPLE OF OPERATION.

When the drill rods are dropped, the column of water and drillings on the inside of the drilling rods does not start instantly at the drop of the rods, hence the water and drillings inside acting as a pump plunger, allow the contents to pass above the valves (A and C, Fig. 116.) That causes the water and drillings to rush in to the rods until after the drill has struck the bottom. The rods are lifted and the operation is repeated until the well has been sunk.

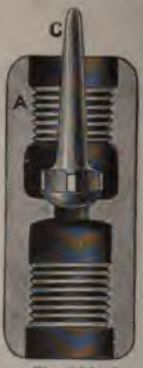


Fig. 593, A.

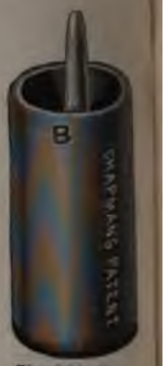


Fig. 593, B.

By continuing the jumping of the drill after the water stratum is reached fine sand and such will be removed. The space occupied by the sand forms a reservoir and enlarges the inlet for the better supply of water to the well.

The great advantage these tools have over others lies in the fact that they do not need to be removed from the hole while making the well, consequently the ease and rapidity with which they work. The deeper they go the greater their weight and the better they work, (as the heavier they are the quicker they drop.

Figs. 593, A and B, shows our M. T. and M. C. Chapman's Patent Hydraulic Blind Valves, Nos. 370,046 and 373,014, dated Nov., 1887. A valve should be placed at every two lengths of drill rods, when the rods are removed from the well, the valve (C) has a stem extending above the coupling portion to better enable it to be taken out of its seat to let the drillings out of the next lower section. The valve seat forms the coupling for connecting the rods together.

The Chapman Hydraulic Drilling Machines.

Patented October 27, 1887. Copyrighted in 1886 by The American Well Works.

This is the Best Hydraulic Tubular Well Outfit.

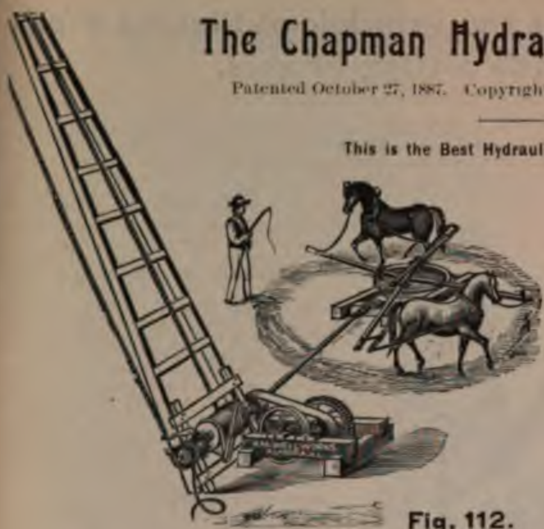


Fig. 112, Outfit No. 35, D Set. For sinking two or three inch wells 300 feet. Price $380.00, including list of tools.

Fig. 112.

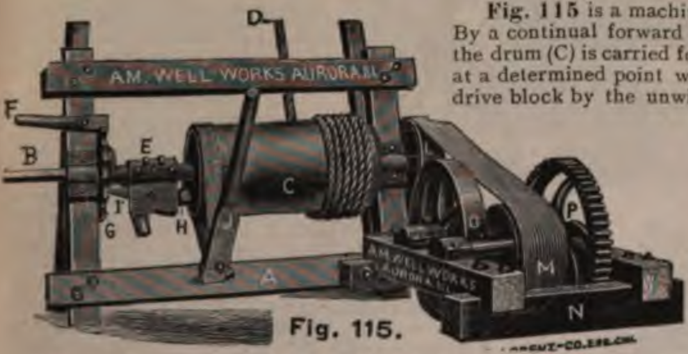


Fig. 115.

Fig. 115 is a machine for jumping the drill. By a continual forward motion of the shaft (B), the drum (C) is carried forward, and is disengaged at a determined point which drops the drill or drive block by the unwinding of the rope from the drum. The swinging balance (N), is for maintaining a uniform motion and receives the return momentum of the drum. As the well is deepened, the cam (G) serves as a temper screw for the lowering of the drill by unwinding more rope.

Fig. 112, Hydraulic Well Drilling Machine, Outfit No. 35, D Set, for sinking 2 and 3-in. 300-ft. wells, including the following tools

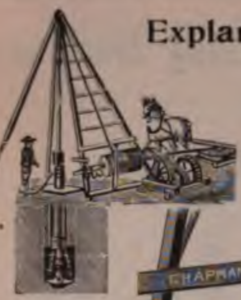
1 1¼-in. Steel Shaft, Fig. 112 Hydraulic Machine only,
1 2-Horse Unmounted Drilling Power,
2 Sweeps,
2 Lead Poles,
2 Tumbling Rods,
3 Knuckles, (T. R. Couplings.)
1 2-in. x 6-in. x 32-ft. Derrick,
1 Set Derrick Irons,
70-ft. 1-in. M. Rope,
1 1-in. Swivel,
285 ft. 1-in. Pipe Drill rods,
1 Length, 1 in. XX Pipe Drill Rod,
1 2-in. Fig. 27-F Drill,
1 3-in. Fig. 27-F Drill,
1 2-in. Fig. 27-P Expansion Drill,
1 3-in. Fig. 216- Expansion Drill,
6 1-in. Blind Valves,
25 ft. ¾-in. 3-ply Hose & Coupl'gs,
1 ¾-in. Stop Cock,
1 Solid Drive Block,
1 1-in. Rod Lifter,
1 1-in. Drive Head,
1 1-in. Rod Turner,
1 4-in Clay Auger,
1 4-in. C. S. Auger,
1 2-in. Force Packing,
1 Pr. No. 2 Brown's Tongs,
1 Pr. No. 3 Brown's Tongs,
1 Pr. No. 4 Brown's Tongs,
2 Pr. No. 3 Robbin Chain Tongs,
1 Pr. 1-in. Slide Tongs,
1 Pr. 1-in. Lift Tongs,
1 10-in. M. Wrench,
1 15-in. M. Wrench,
2 2-in. x 14-in. Jack Screws and Levers,
1 No. 3, Fig. 11 Pipe Puller,
1 Spring Grab,
1 Screw Grab,
1 Valve Grab,
1 Strainer Grab,
1 Sledge,
1 3-in. Fig. 32 Pipe Vise,
1 2-in. Pipe Reamer,
1 No. 2, Fig. 31 Die Stock, with 1-in., 1¼-in. and 2-in Pipe Dies,
1 No. 2 Pipe Cutter,
1 Belt Punch,
1 Cold Chisel,
1 Hammer,
1 Hatchet,
1 Univ. Brace, 3 Bits,
1 Saw,
2 Files,
1 2-ft. Rule,
1 50-ft. Tape Line,
16 Pipe Fittings,
2 Tool Boxes with Locks.

Price for Machine and full enumerated list of Tools, $380.00.

Price of Machines only, to be Used with Other Tools Now In Use.

No. 21½, size O, suitable for drilling 100-ft. well, Fig. 115 Less Balance Jack	$ 60 00
No. 24, Size A—Suitable for drilling 150-ft. well, " " " " "	[illegible]
No. 25, Size C—With Small Balance, suitable for drilling 200-ft. well (Fig. 115.)	[illegible]
No. 26, Size D—With Balance, suitable for drilling 300-ft. well, (Fig. 115)	[illegible]

Explanation of the Principle of Sinking Wells by the Jetting Process.



A.

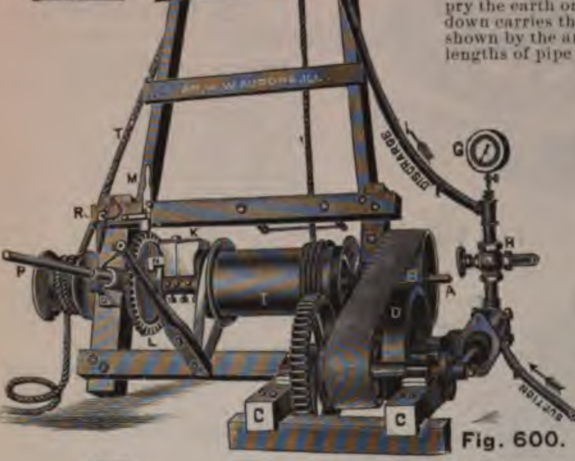


Fig. 600.

Fig. 14 shows an imaginary section of the different strata of earth, and a well pipe being sunk through it. The Paddy Drill in the well is connected to the hollow drill rod. The small cut at the side shows the position of the drill's blades when being raised. To the top of drill rod is connected, our Hydraulic Jetting Swivel, (Fig. 331.) Water is forced by the pump through a hose and swivel down the drill rods and out of the holes in the drill. The swivel admits of the drill rod being turned; each time the drill falls, the blades open and pry the earth or rock loose; the stream of water forced down carries the loose drillings up and over the top as shown by the arrow. As the hole is deepened, additional lengths of pipe drill rods are added. For penetrating beds of quicksand, two swivels should be used in order to have a rod and swivel ready to be connected on the instant the other swivel is taken off.

By using our Blind Valve (**Fig. 593**), bottom side up with a spring to hold the valve up to its seat, the drillings will be prevented from running into the drill and choking it. (This is one of our patented features.) By using this manner of pumping, there is no danger of the rods becoming fast in the well by the settling of quicksand around them if there is a continuous stream of water washing the drillings and caving material to the surface. The water pumped out can be run into pits and allowed to settle, and used over and over.

The Paddy Drill will cut ordinary rocks, but when the rock is very hard, our Shoulder Drill, (**Fig. 386**) should be used. Either will make a hole large enough for the casing to follow, the Paddy Drill will cut the faster.

Our Patented Side Opening Drive Block, (**Fig. 771**) can be put on or taken off when the drill is working, should be used on the top to drive the well pipe when the friction of the earth holds the pipe from sinking by its own weight.

When the water stratum is reached, the continued operation of jumping the drill, and pumping in water, will remove the fine materials, and allow the water to flow freely to the bottom of the well. Blind Valves should be used to pump out the dirt. After the well has been sunk, and a strainer put in, (as shown by **Fig. 39**) with our Force Packing (**Fig. 104**) with a Blind Valve, (**Fig. 593**) on the bottom, and other Blind Valves in the rod, as in hydraulicing. It is best to use the Force Packing, one or two lengths of rods above the bottom, provided that the water rises sufficiently. The flow of water enters below the plunger and passes out of the rods above, and then the Sand does not wear the packing. With the drill rods for opening the water course to the well, there will be no danger of the pipe plunger rod becoming stuck in the well by too much sand coming in when the pumping is started.

Fig. 600 shows a suitable mechanism for jumping the drill and pumping water down. The tools are raised and dropped by the rope (R.) The rope (T) is connected to the Drive Block as shown in Fig. A at top of page. By tightening the rope on the spool, the block will be raised, and by loosening it, the block falls and drives the pipe. The small Fig. A with the horse-power on top, shows a simple derrick and how the derrick is set up and operated, showing the Drive Block resting on the Drive Pipe.

We have several machines that use this principle for sinking wells, to be driven by horse, steam, gasoline and gas power, either mounted or down.

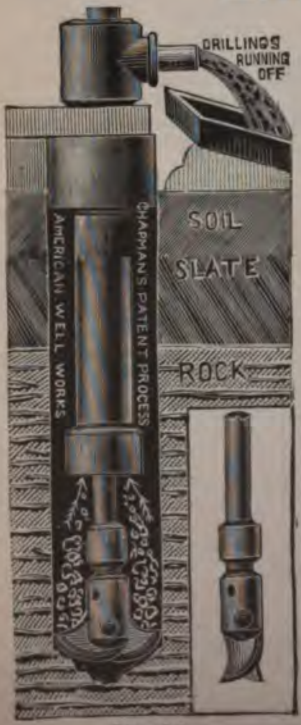


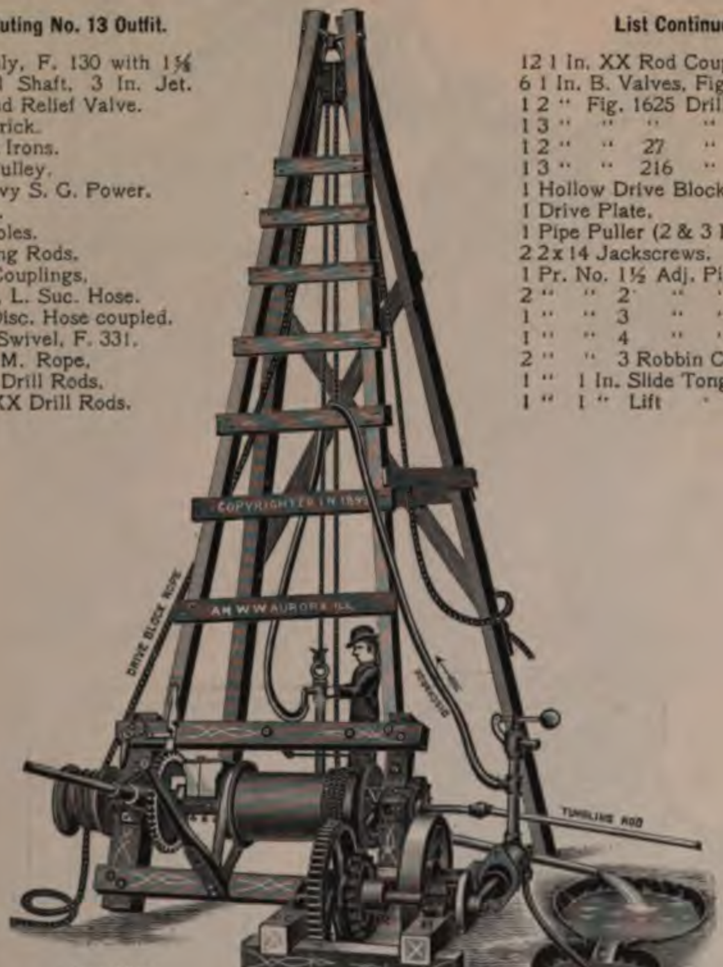
Fig 14.

Lightning Hydraulic Jetting Rig.

Fig. 130 shows our Tubular Well Machine for sinking wells 3 to 2 inch, to 300 ft. or less, through ordinary soft formations or soft rock. It jumps drill, drives pipe, hoists tools, pumps water to wash out drillings, is taken apart for moving, and can be manipulated by two workmen. It is well built, has steel shaft, brass piston pump, rubber cushions, and drops tools automatically so that the horse does the work. For method of operation, see Hydraulic Principles, preceding pages. With our instructions, unskilled people use it successfully. To drill hard rock, add solid drills and bar (Figs. 74, 255). This machine is protected by nine patents.

List Constituting No. 13 Outfit.

1 Machine only, F. 130 with 1⅝ In. Steel Shaft, 3 In. Jet. Pump and Relief Valve.
1 2x6x32 Derrick.
1 Set Derrick Irons.
1 2-Sheave Pulley.
1 2-H. Ex. Hvy S. G. Power.
2 Sweeps.
2 Lead Poles.
2 Tumbling Rods.
3 H. P. Couplings.
10 Ft. 1¼ W. L. Suc. Hose.
25 Ft. 1 In. Disc. Hose coupled.
1 1 In. Jet'g Swivel, F. 331.
140 Ft. 1 In. M. Rope.
285 Ft. 1 In. Drill Rods.
15 Ft. 1 In. XX Drill Rods.



List Continued.

12 1 In. XX Rod Couplings.
6 1 In. B. Valves, Fig. 593.
1 2 " Fig. 1625 Drill.
1 3 " " " "
1 2 " " 27 "
1 3 " " 216 "
1 Hollow Drive Block.
1 Drive Plate.
1 Pipe Puller (2 & 3 In.) F. 11.
2 2x14 Jackscrews.
1 Pr. No. 1½ Adj. Pipe Tongs.
2 " " 2 " " "
1 " " 3 " " "
1 " " 4 " " "
2 " " 3 Robbin Chain Tongs.
1 " 1 In. Slide Tongs.
1 " 1 " Lift "

Fig. 130.

1 1 In. Rod Turner.
1 ¾x1¼ In. Screw Grab.
1 3 In. Vise, F. 32.
1 No. 2 Die Stock, F. 34.
1 1 In. Pipe Die.
1 1¼ " " "
1 2 " " "
1 1 to 2 In. Pipe Cutter.
1 4 In. Clay Auger.

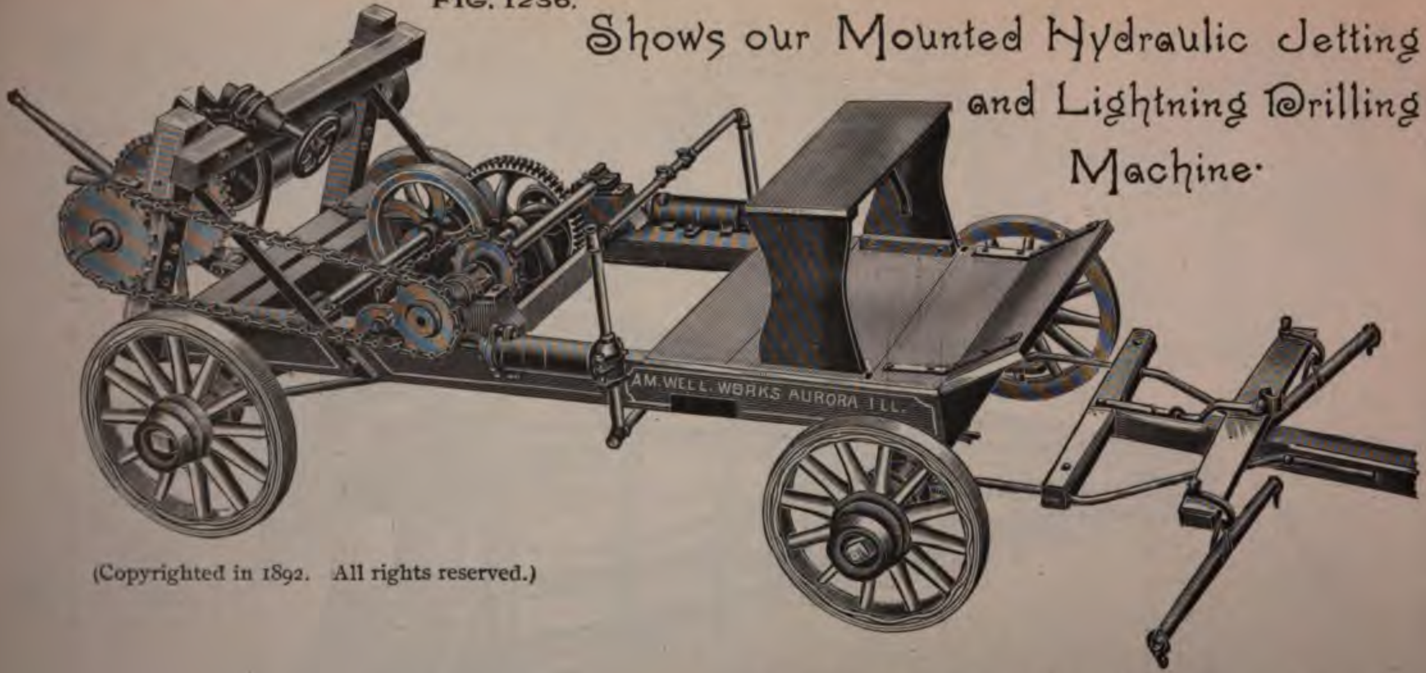
1 4 In. C. S. Auger.
1 Valve Grab
1 Spring "
1 Strainer "
1 2 In. Pipe Reamer.
1 50 Ft. Tape Line.
1 2 Ft. Rule.
1 Saw.
1 Hatchet.

1 Univ. Brace.
3 Bits.
1 Sledge.
3 Files.
1 15 In. Monkey Wrench.
12 Pump Pipe Fittings.
1 Lb. Ea., Hemp & S. S. Pkg.
2 Trip Hooks.
2 Tool Boxes & Locks.

Price, Outfit No. 13, *Machine, Power and Tools complete as listed* ________ Code Roza, **$500.0**

FIG. 1236.

Shows our Mounted Hydraulic Jetting and Lightning Drilling Machine.


AM. WELL. WORKS AURORA ILL.

(Copyrighted in 1892. All rights reserved.)

Size of Steel Shaft used in machine	1⅝	2	2½
Depth it will drill a 2 or 3 inch Well	300	600	900
Size of brass piston pump furnished, inches	4	4	5
Price of Fig. 1236	$265 00	$320 00	$

The Automatic motion of the machine engages and disengages the Winding Drum and is the same as that shown by Fig. 743. (We have dispensed with the troublesome spring.) It has two brass piston pumps for pumping roily water over and over again; has an adjustable spring to check the too rapid return of the drum; includes our Chapman patent automatic drop; will strike a hard blow with light tools. We make the machine of 3 sizes, viz: with 1⅝, 2 and 2½ inch steel shafts.

The spring on the lever is very valuable in adjusting the drop so as not to break the drill rods with the quick blow when

Hydraulic and Jetting Drilling Outfits.

Fig. 743 illustrates one of our patent Hydraulic and Jetting Lightning Well Sinking Machines ready to attach to the derrick which is not shown. It is protected by patents dated June 6, 1882, Oct 18 1887 and May 15th, 1888.

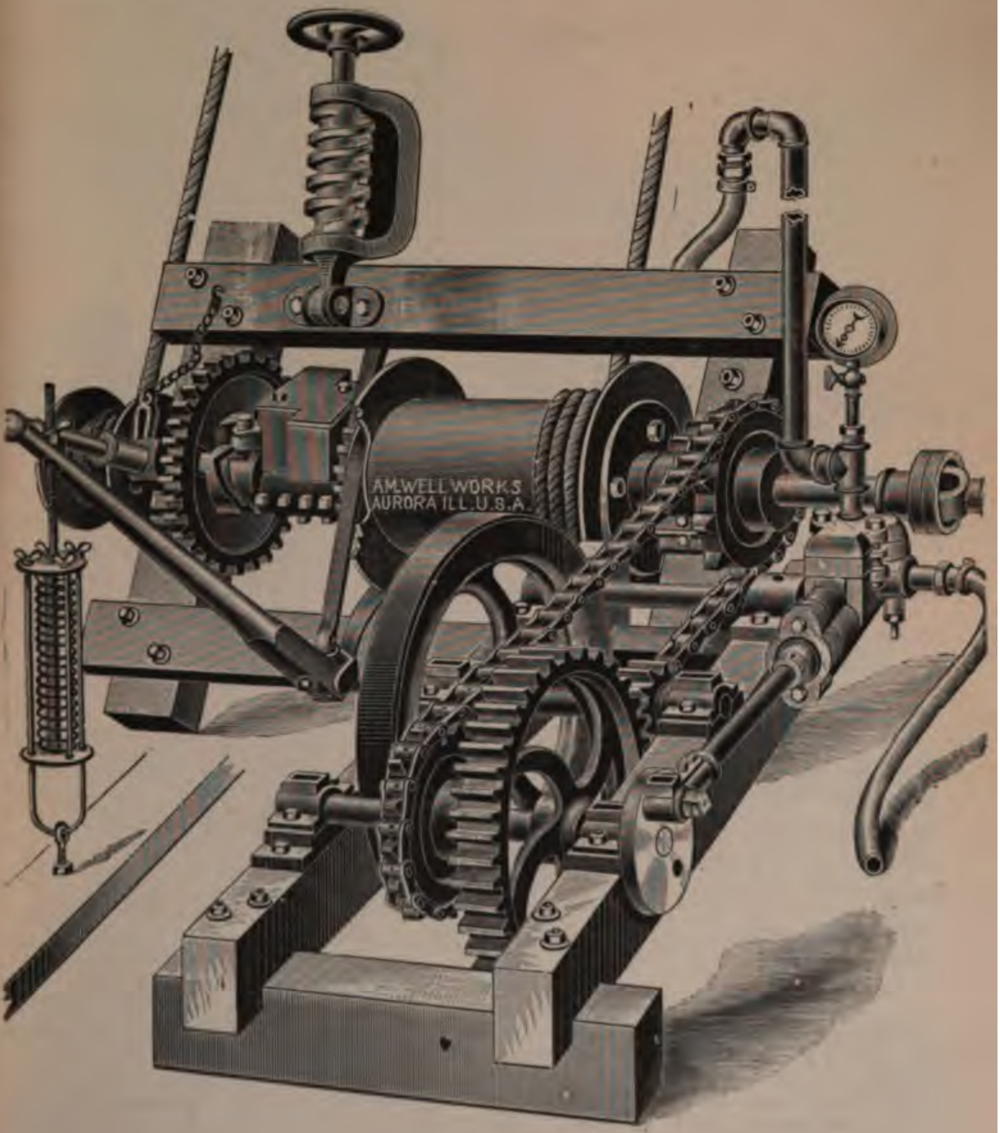


FIG 743.

(Cut copyrighted by The American Well Works in 1889.)

It is driven by horse power, but may be run by a gasoline engine, steam engine or other power. It jumps the drill automatically, drives pipe, hoists tools, and pumps water down the well to wash out the drillings, as shown in Fig. 14 and will pump water out of the well to test it. The horses do the work, two men (often one) manipulate it, and unskilled workmen with our instructions use it successfully. It is taken apart for transportation.

Fig. 743 outfits have a wide range of adaptability, being suited for sinking wells and prosp for coal or ore, through dirt, sand, clay, soapstone, shale, gravel, cemented gravel, conglom soft rock, rotten lime and sand rock, and like formations. With the addition of solid Z Dril solid drill bar, they drill hard rock. There are hundreds of these outfits at work in all parts country, and they are thoroughly practical and reliable.

List Constituting Fig. 743 Outfits.

1 Drilling Machine, with Double Actg. Osc. Pump. Fig. 743.
1 Horse-Power, complete.
1 32 ft. Derrick.
1 Derrick Iron.
2 Trip Hooks.
10 ft. Suction Hose.
25 ft. Discg. Hose and Couplings.
1 Water Pressure Gauge.
2 Ropes.
2 1-Sheave Pulleys. Fig 256.
1 2 " Pulley. " "
1 Hyd. Drill Pipe and Couplings.
Drill Rods for depth.
25 Extra D. R. Couplings.
1 Rod Lifter. Fig. 362.
1 Hollow Drive Block. Fig. 771.
2 Wr't Drive T's (2 sizes). Fig 753.
1 Pipe Puller. (2 sets Dies). Fig. 11.
2 Jack Screws,
6 Hyd. Blind Valves.
2 Drills, (2 sizes). Fig. 1625.
4 Exp. Drills (2 sizes). Fig. 216.
1 Clay Auger. Fig. 26.
1 Cobble Stone Auger. Fig. 25.
1 Jetting Swivel. Fig. 331.
1 Sledge.
1 Forged Drive Plate.
1 Hollow Spring Grab.
1 " Friction Grab.
1 Screw Grab. Fig. 764.
1 Die Stock. Fig. 34.
1 2" Pipe Die.
1 1 1-4" Pipe Die.
1 1" Pipe Die.
1 Pipe Cutter, No. 2.
1 Pipe Vise. Fig. 32.
4 Prs. Adj. Tongs. Fig. 80.
2 " Chn. Tongs. Fig. 1376.
1 " Slide Fig. 30.
1 " Lift Fig. 33.
1 Rod Turner. Fig. 559.
1 Drive Head. Fig. 774.
3 Files.
2 M. Wrenches.
1 Trimo Pipe Wrench.
1 Univ. Brace. 3 Bits.
1 Saw.
1 Hatchet.
1 Hammer.
1 50 ft. Tape Line.
1 2 ft. Rule.
2 lbs. Pump Packing
5 Ass'd Nipples.
1 Gauge Nipple.
1 Gauge Bushing.
4 Elbows.
2 Tees.
2 Tool Boxes and Locks.

Rock tools not included. If hard rock is to be drilled, add 2-Z Drills and Bar. We wil mount drilling machine or horse-power at small additional price.

Number of Machine.	1	2	3	4	5
Depth will sink in feet.	300	400	500	300	30
Diameter (inside) of well pipe will sink, inches.	2 & 3	2 & 3	2 & 3	3 & 4 1-2	4 1-2
Horse-Power furnished, size of	2	4	4	4	4
Double Acting Oscillating Pump, diam. inches.	3	3	3	4	4
Price Fig. 743 Mach. with above list of tools	$500	$610	$680	$750	$80
" " " " **only**, no ropes, or hose.	200	250	300	350	36

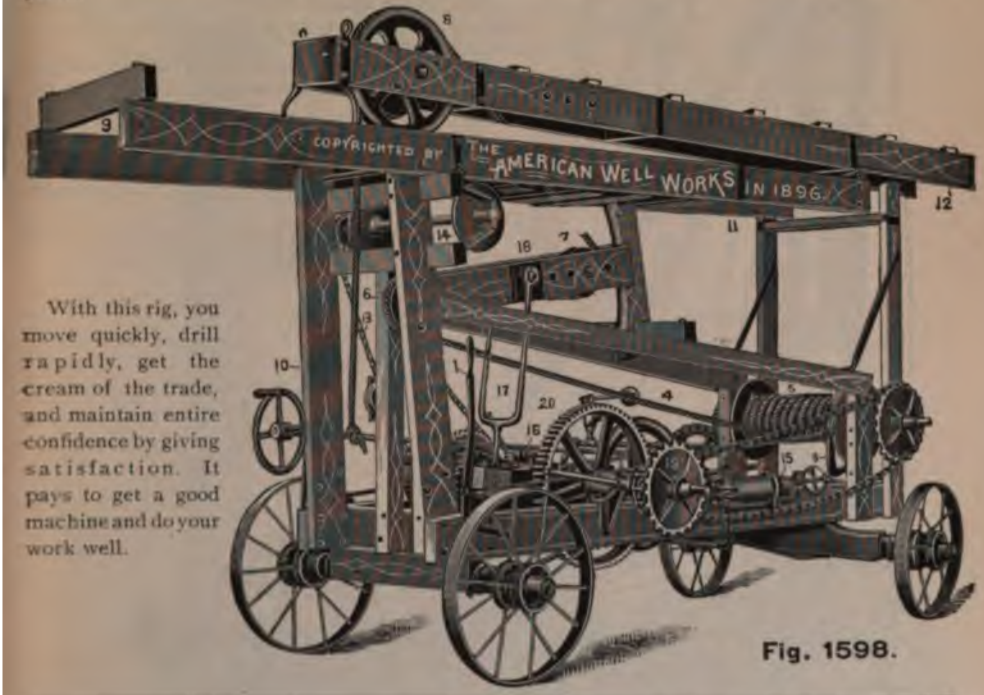
Fig. 1598 is an illustration of our latest improved **Elliptical Drilling Machine,** uses Animal, Steam, Gasoline or Gas Engine Power. The elliptic gears raise drill slowly with great power, and drop it quickly to give free, effective blow. It sinks wells by Hydraulic, Jetting, Pole, or Cable Tool Principles. Derrick is swung to erection for work. When moving, it is folded. Drill rope (4) passes around pulley in pivoted end of walking beam, then around oscillating end, and over crown pulley (S) to drill. (14) is a sand reel driven by chain (12). Machine has two brass plunger pumps (15), steel wheels, shafts, and pulley pins.

Advantages: 1st. Rope passing over pivot end of walking beam, does not move on pulleys when drilling,—prevents wear.

2nd. Rope, Drum and Pivot Pulley being a long distance apart, prevents rope riding on drum and chafing.

3rd. Hand Wheel adjusts worn feedout for drilling any depth without stopping.

4th. Sets up and takes down quicker, drills more feet of well than other makes, hence larger profit.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With this rig, you move quickly, drill rapidly, get the cream of the trade, and maintain entire confidence by giving satisfaction. It pays to get a good machine and do your work well.

Fig. 1598.

Prices Fig. 1598 as listed, with Tongue, Whiffletrees and Neck Yoke, (no Ropes.) Drilling Tools and Power not included in these prices. For tools see lists of kind wanted	Price Machine only. (Sprocket Wheel or Pulley (19) for Engine Extra.)	Price with Boiler Engine and 1 Pump (Duplex), mounted on same Truck, similar Fig. 1529.	Price with Single-Acting Gasoline Engine mounted on same Truck,	Price with Double-Acting Gasoline Engine mounted on same Truck,	Add this Price to Lists if Friction Hoist wanted instead of Clutch on Draw Works.
No. 1, for **300** ft. (with Pumps for Jetting Tools)	$310.00	$ 775.00	$		$20.00
No. 2, " **500** " " " " " "	400.00	990.00			25.00
No. 3, " **750** " " " " " "	600.00	1250.00			30.00
No. 4, " **300** ft. (Less Pumps for using Cable or Pole Tools)	270.00	735.00			20.00
No. 5, " **500** " " " " " " " " "	355.00	945.00			25.00
No. 6, " **750** " " " " " " " " "	540.00	1190.00			30.00

Gasoline Elliptical Drilling Machine

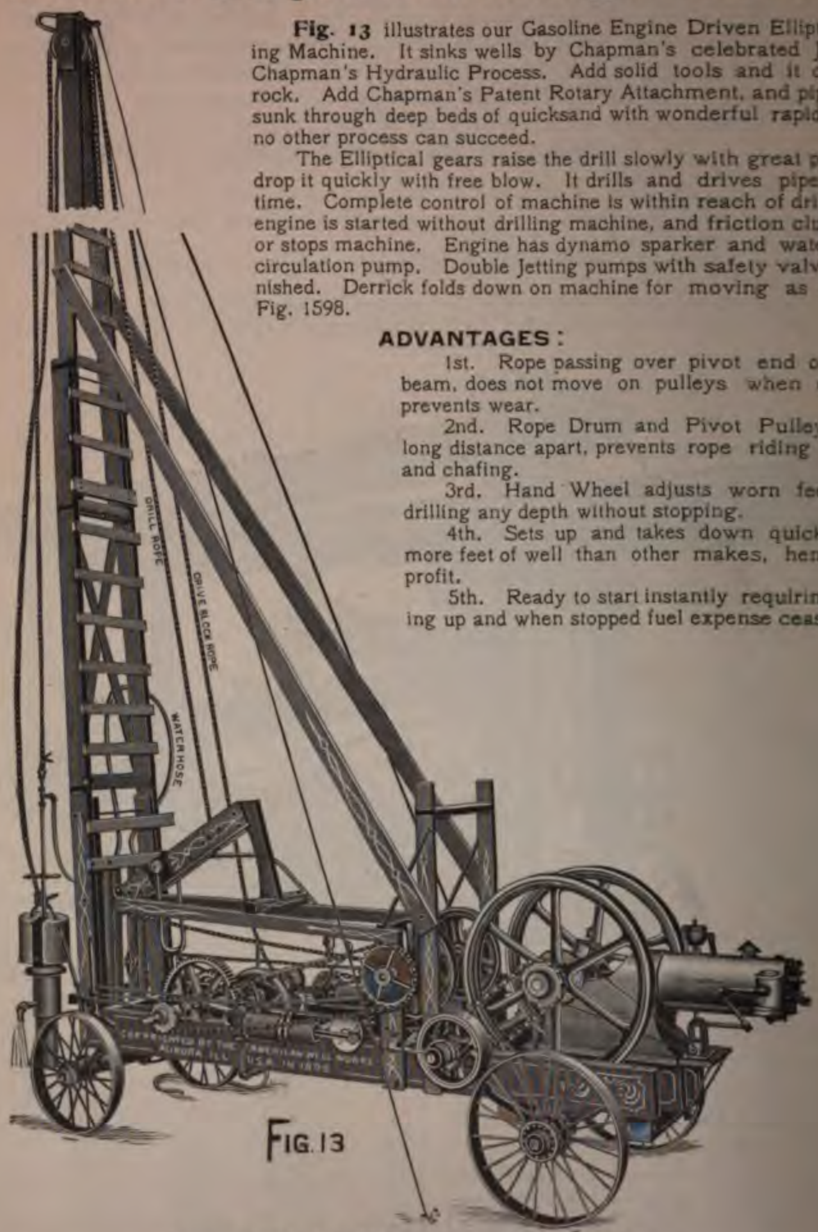


Fig. 13 illustrates our Gasoline Engine Driven Elliptica ing Machine. It sinks wells by Chapman's celebrated Jetti Chapman's Hydraulic Process. Add solid tools and it drill rock. Add Chapman's Patent Rotary Attachment, and pipe sunk through deep beds of quicksand with wonderful rapidity no other process can succeed.

The Elliptical gears raise the drill slowly with great pow drop it quickly with free blow. It drills and drives pipe a time. Complete control of machine is within reach of driller engine is started without drilling machine, and friction clutch or stops machine. Engine has dynamo sparker and water circulation pump. Double Jetting pumps with safety valve a nished. Derrick folds down on machine for moving as sho Fig. 1598.

ADVANTAGES:

1st. Rope passing over pivot end of beam, does not move on pulleys when dril prevents wear.

2nd. Rope Drum and Pivot Pulley long distance apart, prevents rope riding on and chafing.

3rd. Hand Wheel adjusts worn feedo drilling any depth without stopping.

4th. Sets up and takes down quicker, more feet of well than other makes, hence profit.

5th. Ready to start instantly requiring ing up and when stopped fuel expense ceases.

FIG. 13

PRICE FIG. 13, MACHINE AND ENGINE.

Ropes, Hose and Tools not included in price. For these, see Hydraulic and Jetting Tool List on an adjacent pa

NO.	Depth sinks. Ft.	H. P. of Engine	Code.	PRICE.	Code if Friction	ADD TO LIST friction instead clutch on draww
1	300	6	Ragas	$880.	Rogas	$
2	500	8	Regas	1160.	Rugas	
3*	750	12	Rigas	1680.	Rygas	

*No. 3 has engine, tank and appliances mounted on separate steel trucks.

PRICES FOR FIG. 715.

For Tools, see Index, "Hydraulic Jetting Tools."

715 Machine as here described.	Depth, feet for	Size well for inches.	PRICE.
1	300	2 and 3	$560.00
2	300	3 " 4¼	775.00
3	500	3 " 4½	875.00
4	500	4½ " 6	1000.00

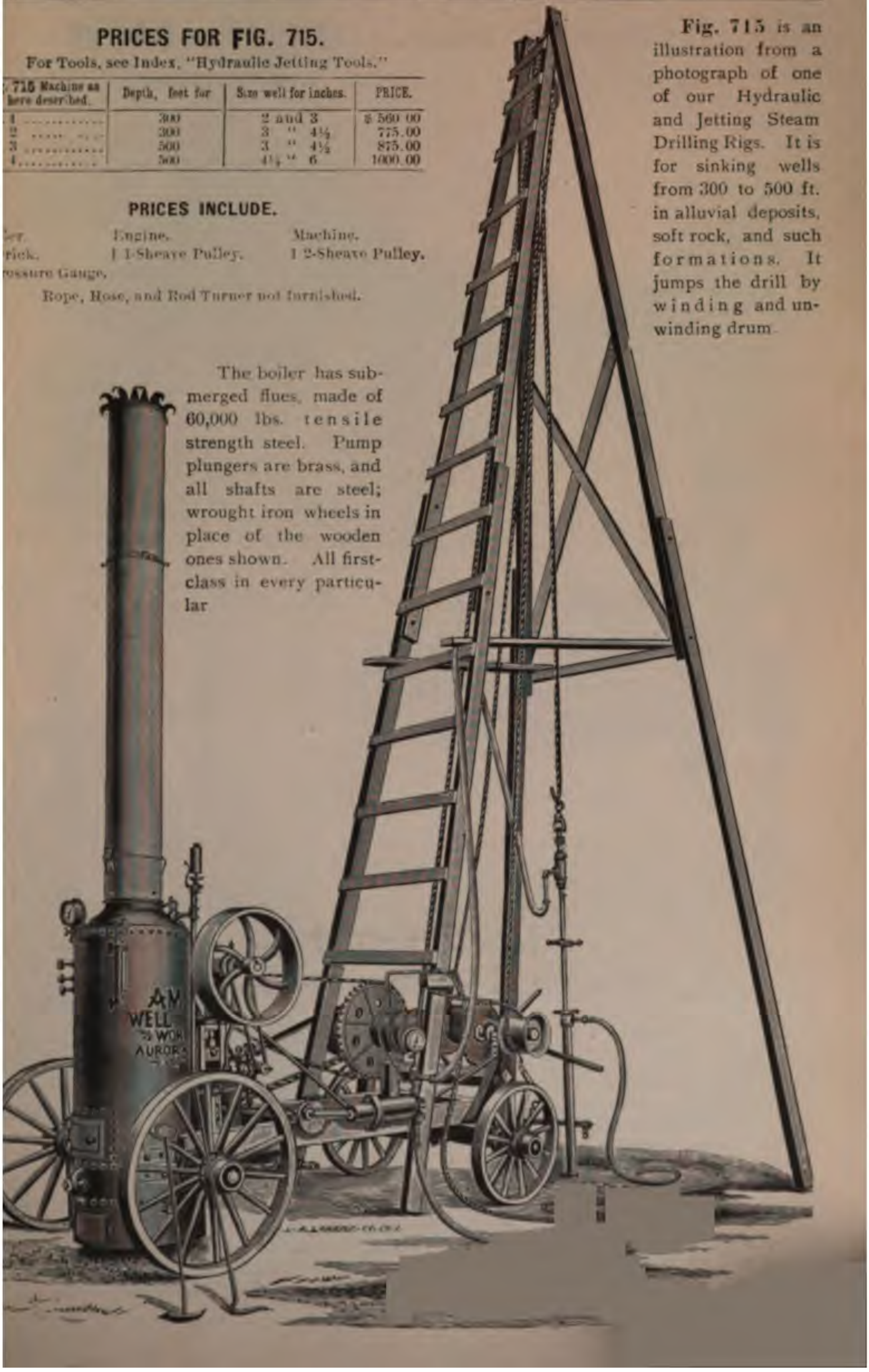
PRICES INCLUDE.

er.	Engine.	Machine.
rick.	1 1-Sheave Pulley.	1 2-Sheave Pulley.
ressure Gauge.		

Rope, Hose, and Rod Turner not furnished.

Fig. 715 is an illustration from a photograph of one of our Hydraulic and Jetting Steam Drilling Rigs. It is for sinking wells from 300 to 500 ft. in alluvial deposits, soft rock, and such formations. It jumps the drill by winding and unwinding drum.

The boiler has submerged flues, made of 60,000 lbs. tensile strength steel. Pump plungers are brass, and all shafts are steel; wrought iron wheels in place of the wooden ones shown. All first-class in every particular



Hydraulic and Jetting Tool List

For Figs. 13, 715, 1598 and other Portable Machines.

1 Horse Power.
4 Sweeps.
2 T. Rods.
3 Knuckles.
2 Ropes.
1 Suction Hose.
1 Discharge Hose.
1 Rod Turner.
1 Heavy Drill Rod.
Drill Rods for Depth.
12 XX Drill Rod Couplings.
1 Jetting Swivel. F. 331
1 Drive Tee, F. 753
1 Forged Bushing.
2 Fig. 27 F Drills (2 sizes.)
4 Paddy Drills (2 each size.)
2 Fig. 745 Drills (2 sizes.)
1 Clay Auger.
1 Cobble Stone Auger.
1 Strapped C Hook.

1 Rod Lifter F. 362.
1 Hollow Drive Block.
6 Blind Valves. F. 593.
1 Pipe Puller, F. 11 (2 sizes.)
2 Jack Screws.
1 Pr. Slide Tongs.
1 " Lift Tongs.
2 " Chain Tongs (F. 1375.)
1 " No 1 1-2 B Tongs.
2 " No 2 " "
1 " No 3 " "
1 " No 4 " "
1 Drive Plate.
1 Grab, F. 29.
1 " Spring.
1 " F. 764.
2 " Friction.
1 No. 2 Die Stock.
1 2-in. Die.
1 1 1-4-in Die.

1 1-in. Die.
1 No. 2 Pipe Cutter.
1 Pipe Reamer.
1 " Vise.
1 Drive Head (F. 774.)
1 15-in Monkey Wrench.
1 10-in " "
3 Files.
1 Univ. Brace.
3 Bits.
1 Saw.
1 Hatchet.
1 Hammer.
1 Sledge.
1 Tape Line.
1 2-Ft. Rule.
1 Lb. Hemp Packing.
1 Lb. Soapstone Packing.
2 Tool Boxes and Locks.

If hard rock is to be drilled, get Rock Tools listed below.
For larger diameter of wells, have adjustable Screw Plate added for threading pipe.

Outfits	PRICE, FIG. 13, 715 AND 1598 MACHINES WITH ABOVE LIST OF TOOLS.	Depth will sink. Ft.	Diam. Pipe will sink. In.	Size Horse Power furnished	Code	Price Machine and Tools
354	FIG 1598	300	2 & 3	4	Rab	$ 640.
357	" "	300	3 " 4½	4	Reb	755.
358	" "	500	2 " 3	8	Rib	765.
359	" " (1½ Drill Rods X Heavy)	500	3 " 4½	8	Rob	885.
360	" " " " " "	750	3 " 4½	12 Boiler	Rub	1700.
361	" " X Drill Rods (Less H. P. & Pumps Boiler, E. & S. Pump added)	750	4½ " 6	12 "	Rac	1780.
362	FIG. 715	300	2 " 3	5 "	Rec	890.
363	" "	300	3 " 4½	6 "	Ric	1220.
364	" " (1½ Drill Rods X Hvy	500	3 " 4½	6 "	Roc	1360.
365	" " " " " "	500	4½ " 6	8 "	Ruc	1535.
369	FIG. 13	300	2 " 3	6 H. Eng.	Rad	1140.
372	" "	300	3 " 4½	6 "	Red	1290.
373	" "	500	2 " 3	8 "	Rid	1455.
374	" " (1½ Drill Rods X Heavy	500	3 " 4½	8 "	Rud	1575.
375	" " " " " "	750	3 " 4½	12 "	Raf	2130.

Rock Tool List

For Figs. 13, 20, 1598 and other Portable Machines.

1 Rope Loop or Socket.
1 Set Guided Jars.
1 Drill Bar.
2 6-in. Drills (Z or Club.)
1 Drill Gauge.
2 Hvy Drill Wrenches with Claws.
1 Chain Lever Tightener, F. 1078.
1 Sand Pump, F. 418 Flat Valve.

1 Hollow Drive Head, F. 1081.
1 Set Driving Clamps, F. 1076.
1 15-in. Monkey Wrench,
1 Oil Can.
1 Cold Chisel.
Hawser Laid Cable for Depth.
(If for Fig. 20 Steel Cable.)
Sand Line for Depth.

Price of Rock Tools as specified for	300 feet	Ref	**$260.**
" " " " " " " "	500 "	Rif	**280.**
" " " " " " " "	750 "	Rof	**340.**
" " " " " " " "	1000 "	Ruf	**390.**

Have a Forge, Anvil and Hand Hammer added and do your own tool dressing.

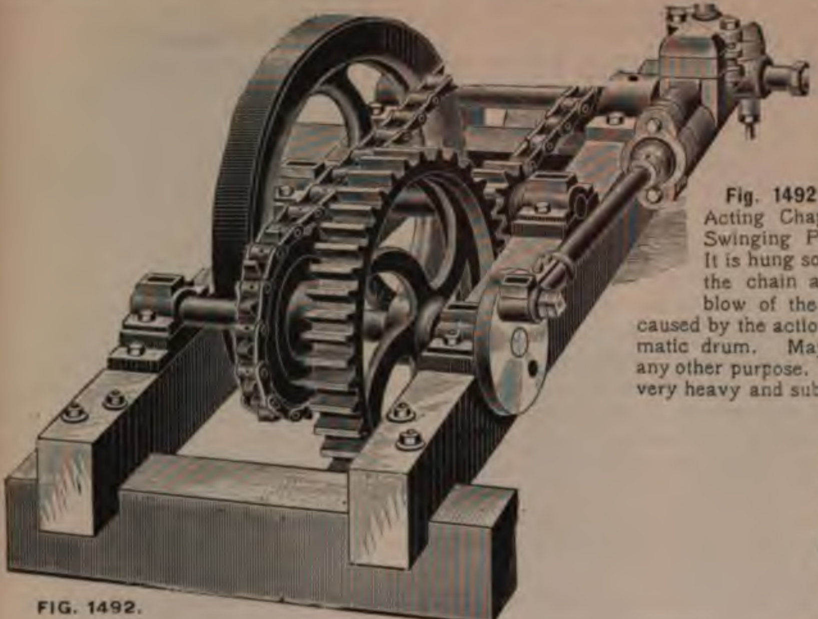


FIG. 1492.

Fig. 1492 is a Double Acting Chapman's Patent Swinging Pumping Jack. It is hung so as to tighten the chain and relieve the blow of the back motion, caused by the action of the automatic drum. May be used for any other purpose. This is made very heavy and substantial.

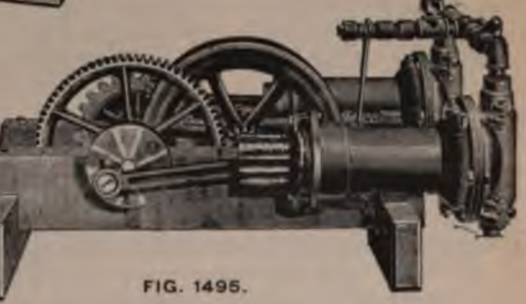


FIG. 1495.

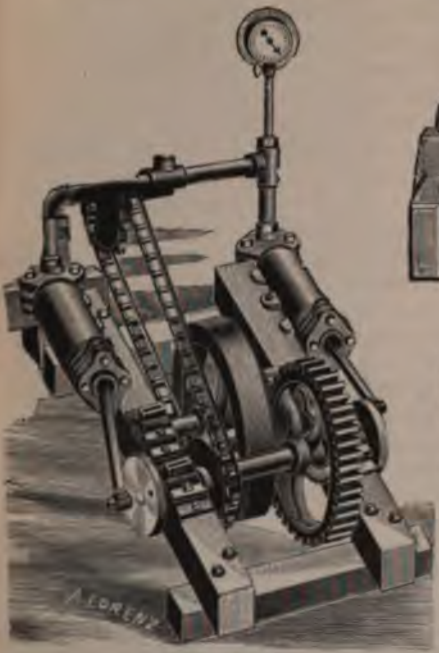


FIG. 1493.

Fig. 1493 is Chapman's Patent Swinging Pumping Jack, having single acting brass plunger pumps especially adapted for pumping roily water that has been used several times in the well for jetting. The pressure gauge is included in the price.

Fig. 1495 shows our Brass Plunger Packed Pumping Jack. Price includes a chain wheel but belt wheel can be furnished with slight addition to price. This pump has a diaphragm similar to canvas bolted between the cone disc. When the pump draws the water in, the canvas follows the plunger, and when it goes back the canvas goes out so that the water in the plunger stays there, and the water is pumped, and remains outside of the diaphragm, and hence very muddy water can be pumped without injuring the plunger.

PRICES FIGS. 1492, 1493 AND 1495 PUMP JACKS.

Outside Diameter of Pump Plungers in inches	3	4	5	6
Fig. 1492, with Chain Belt and 1 Sprocket Wheel	$44.	$50.	$	$
" " " Belt and Pulley, less Pump Chain and Sprocket Wheel	35.	40.		
" **1493,** " one S. A. Pump only, with Chain and Sprocket Wheels	44.	50.	60.	
" " " with two S. A. Pumps, with Chain and Sprocket Wheels	50.	65.	75.	
" " as last with one Pulley, no Belt	44.	50.		
" **1495,** with two Pumps			75.	110.
" " " one Pump			60.	85.

Lightning Revolving Process.

Protected by Patents.	No. 309.926 " 443.071	No. 373.440 " 371.548	No. 443.070 " 443.069	No. 309.927 " 443.072	No. 382.689 " 541.835

This is a description of our Lightning Revolving Hydraulic Well Sinking Process, the fastest process of sinking wells known. First, we discovered the Hydraulic Process, which was very rapid. Second, we discovered the Jetting Process. Third, we discovered the Revolving Process, by which wells are sunk with lightning rapidity. The tube sinks so quickly, we can scarcely believe our eyes as it seems more like a dream than reality. It consists of a Revolving Machine which grips and turns the well pipe. The bottom end of pipe is shod with a toothed steel cutter called a shoe, (a saw) made of the best steel, without seam or weld; and cuts a path for well pipe to follow. To upper end a water swivel is connected, to which one (or more) hose is attached for supplying water for washing out borings as they are made. The water goes to bottom, and passes out between the teeth of cutter, carrying cuttings up and out with current of water, keeping well clear, so that well pipe may have a free and easy movement. (See cut Fig. 352). The pipe well is sunk with, forms the wall of well when completed. The Revolving Machine works on same principles as Diamond drill and sinks a well by revolving the pipe of which the wall of well is made. The core is left standing in pipe to be worn away by the turning of the pipe, or to be washed out, or to be utilized when reaching beds of sand. When core is of clay or such, on reaching beds of sand, gravel, or cavities in the earth where water will run away, the force of the water going down carries core down and fills the cavity or pores in sand and gravel, and makes a clay wall around casing which prevents wasting of water and keeps quicksands from caving against casing while pressure of water is sufficent to keep stream of water flowing over at surface. When core is not wanted, boing tool has a cross cutter bar. In case there is not sufficient clay to make a clay wall, we force clay drown the pipe which stops the pores in earth and prevents quicksand and gravel or other caving material from crowding against pipe and binding it. By regulating discharge any desired pressure can be maintained. We have demonstrated that our machinery will sink any size pipe of sufficient strength to the greatest practical depth. Caissons for bridge abutments may be sunk by this process in any depth of water.

Even where it has been impossible to make deep borings by jumping drills by reason of alternate strata of hard rock and quicksand, we succeed with the Revolving Machinery. The hole is sunk with wrought iron or steel tubing. Diameter of hole can be made as large as any tubing can be made with which to bore it. Large numbers of wells have been sunk with 15 in. internal diameter wrought iron pipe.

The superiority of this principle over anything ever before used is so great that it will pay any one having a well sinking machine, to add our Revolving Process Machinery.

Fig. 352 illustrates a section of earth (such as are penetrated in sinking wells in alluvial deposits of Mississippi Valley), and a well as pipe is being sunk. The pipe is shown with cutter at lower end, and part in section to show core within. Arrows indicate current of water as it passes down in pipe and up, carrying borings up on outside.

The deepest well sunk by this process in alluvial deposits, was sunk by J. W. Brynes & Co., on Galveston Island, in the Gulf of Mexico, to a depth of 3,067 feet with our heaviest rotary machine. 60 ft. of 22-in. pipe was used; 868 ft. of 15-in pipe; 12-in pipe was used to depth of 1500 ft. and 9-in. to 2363 ft., well was finished with a 5-in pipe to great depth of 3067 ft. There is no other record of a well having been sunk in exclusively alluvial formations to such a depth before, and the work could not have been done with any other kind of machinery.

DIAMOND ATTACHMENT TO REVOLVING PROCESS.

We make a Diamond Attachment to work with our Revolving Machinery. The machine that revolves the casing pipe is the machine that does the diamond boring.

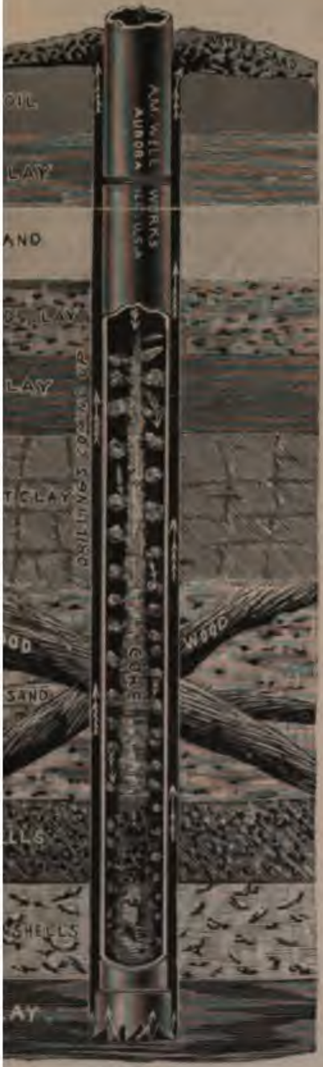


Fig. 352.

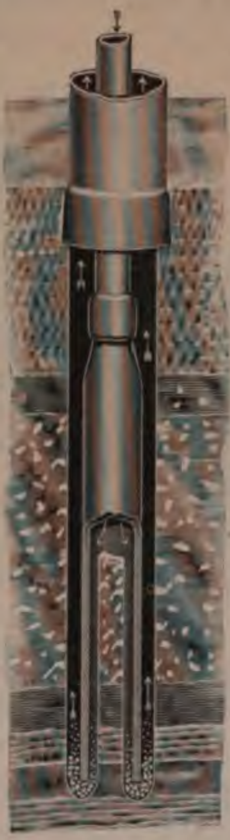


FIG 127

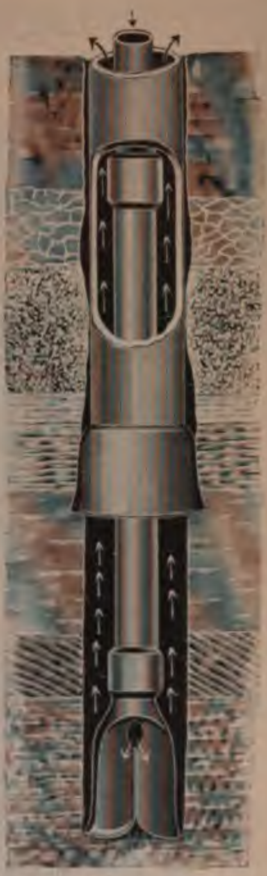


FIG 147

Fig. 147 illustrates alluvial formations penetrated by Revolving Process, using our Fig. 1024 Drill. Sufficient pipe is put in at surface to shut off caving material so borings will be washed up over top. The hole is then run down with bit as illustrated, and when water, sand or gravel, is reached drill is taken out and casing put in with screen, Fig. 1284, seated in water bearing stratum, completing well. Water holes in drill shown are kept small so the two streams strike bottom of hole with great force, assisting boring.

g. 127, Adamantine Application:—Since our Revolving Machinery was placed on market, we
troduced a metallic composition called Adamantine, which we use with our Revolving machin-
sinking or coring holes through hard rock or other materials, save that it is not suited for dirt
ta in which Adamantine will be lost. In soft material, regular Revolving Process is used, but
ard strata are encountered use Adamantine. With Adamantine, a 9¼ inch hole has been
480 feet in two months through hard rock. In repeated cases, wells which were failures owing
ility of any other known means to penetrate hard strata encountered, Adamantine has made a
s. Steel club and other drills broken off and fast in hard rock, have been removed from wells
hs down to 1500 ft. by use of Adamantine with our rotary machine. It cuts over these and
ck below, and when bit is drawn up, it brings the lost drill with it, permitting hole to be con-
By use of Adamantine and Revolving Machinery, cores can be taken from bore of larger
er than practical with Diamond Drill, on account of small expense of Adamantine. The
ntine being cheap, difficulties heretofore experienced in penetrating hard strata by Revolving
s is entirely overcome.

Lightning Rotary Set-up.

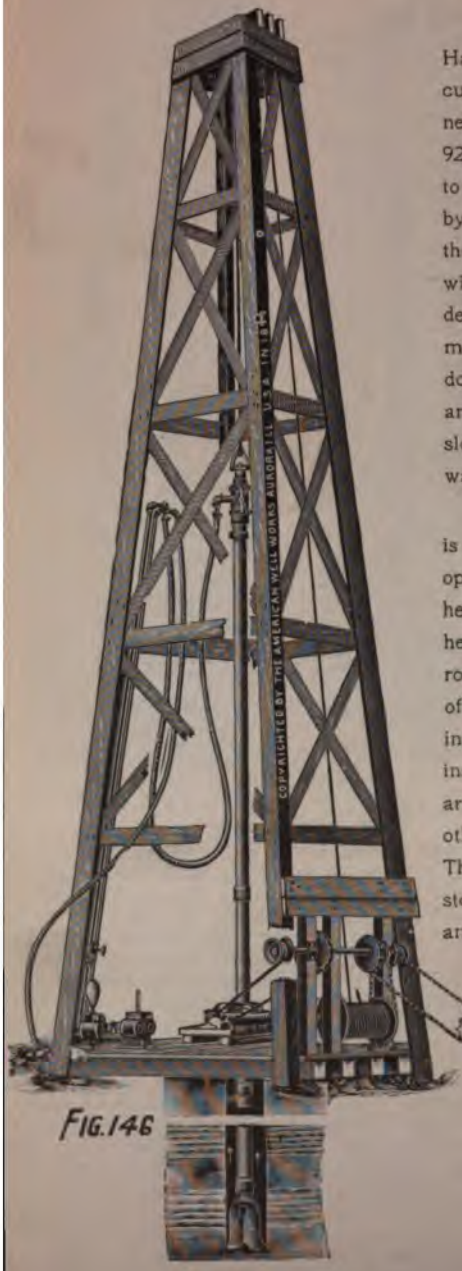

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FIG. 146

Fig. 146 represents these machines in oper
Hang in derrick a line of pipe, having a steel
cutter on bottom, a downward opening check
near top, and a hydraulic ball-bearing Swivel
925) screwed to upper end and connected by a
to water supply pipe. Each hose has a water
by which water is turned on and off. Place
the rotary, plumb it, and hoid it centrally in
with plank secured to the horizontal braces
derrick. Start machine and turn on water. Th
may be raised, dropped, or gradually lowered.
don't get excited by the rapid decent of well
and think the bottom has fallen out. Keep co
slow, **watch over-flow,** and do not sink pipe faste
water will carry borings out.

Connect up another line of pipe while ma
is working. To unscrew swivel head put
opposite each other in the holes in the
head. Start rotary machine forward holding
head. Head will become unscrewed. Have a
rope tied into top end of this swivel, and the othe
of rope wound around the cathead. The person
ing a lever in one hand, holds rope in other.
instant it becomes unscrewed the man with
around cathead raises swivel with one hand, and
other hand swings it onto the platform out of
The other man by this time has disengaged rotar
stopped it. He takes the rope that is around
and swings down on it, which raises pipe, an
other man steers pipe into coupling, (top
pipe being held plumb by the guides), and
pipe clamps forward that are bolted on pipe.
other man reverses the rotary, turns the
backwards, (not more than four revolutions)
screws it together quickly, then switch the
from one hose to other. By practice, this co
tion is made in fifteen seconds, and pump
stopped. The check valve in well pipe pre
weight of mud and water on outside of
from forcing water up over workmen
making connection; also prevents stoppi
bottom of pipe with cuttings.

Chapman's Hydraulic Rotary Boring Outfit.

Fig. 1713 illustrates our hydraulic rotary boring outfit suitable for sinking shallow or very deep wells through alluvial formations, and, with suitable additions, for sinking wells through deep beds of quicksand and like formation.

In sinking wells which do not cave, the hole is bored with rotary drill on the end of boring rods, and is cased afterwards.

In wells which cave, a rotary cutter is used on the end of the pipe to cut the hole and this pipe when through the caving material is left in place to case the well.

This style of outfit has a record of completing an oil well 1065 feet deep in 32 hours.

List of Tools for Chapman's Hydraulic Rotary Boring Outfit, not Included in Prices of Machines.

1 Pair Turning Clamps.
1 Boiler with Stack and Injector.
1 Poker.
1 Ash Hoe.
1 Shovel.
1 Flue Cleaner.
1 Revers. Engine and Spr. Whl. (799)
1 Duplex Pump. (1282, 1568)
1 Pump Spanner.
1 Rt. Angle Pump Suction. (15 Feet)
1 Pump Discg Stand Pipe (15 Feet.)
(If 2 swivels branch pipe & valves.
2 Pat. Hose Couplings (760)
1 Hose Spanner.
25 Ft. Water Hose.
1 Ball Bearing Rotary Swivel (725)
1 Swivel Bar.
1 Set Casing Heads.
1 Set Forged Boring Bushings.
2 (each size) Rotary Drills (1024).
5 Crown Pulleys.
1 4-Sheave Pulley.
1 3- " "
1 1- " "
1 1 in. Snatch Block (1150).
1 Heavy Strapped C. Hook.
1 Heavy Rope Swivel.
600 ft. Manilla Rope.
120 ft. 1 in. Manilla Rope.
2 Pr. Chain Tongs (1376).
1 Pr. Slide Tongs.
2 Pipe Wrenches.
1 Adj. Die Stock and Dies.
1 No. 2 Pipe Cutter.
1 Pipe Vise (234).
1 Brace.
6 Bits.
1 Saw.
1 Hatchet.
1 Ax.
1 Tape Line.
1 Tool Box and Lock.

U. S. **Patents** 382689, 409272, 443070.

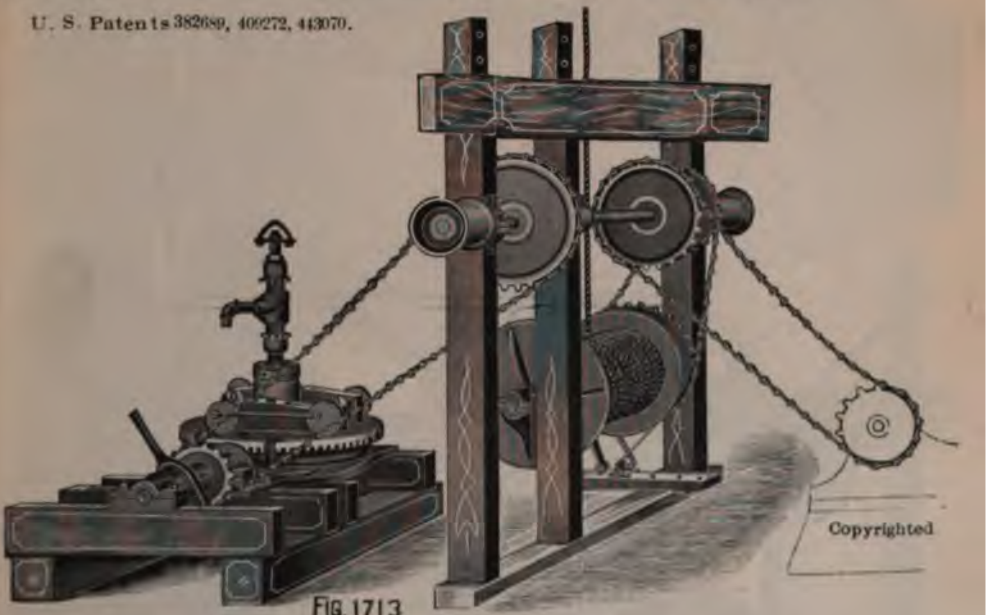


FIG. 1713

You will need to provide well piping for work to be done, and the smaller size is used for the boring rods. Modify tool list to suit requirements. In making inquiry, state inside diameter of wells you will sink, depth, material to be encountered, together with information that may assist us.

Price Heavy Hoisting Machine only. Rotary Machine, with Turning Posts, and Rotary Wrench, Engine and Rotary Sprocket Chains, (25 ft. each). Price tools not included.

For 6 In. and smaller wells, 3½ in. shaft drum, (Single Gear Rotary with Clutch $600 (Double G. Rotary $840
" 8 " " " " 3½ " " " " " " " " 670 " " " 730
" 10 " " " " 4 " " " " " " " " 920 " " " 1000
" 12 " " " " 4 " " " " " " " " 975 " " " 1075
" 15 " " " " 4 " " " " " " " " 1225 " " " 1330

Fig. 1289 shows our **Complete Lightning Revolving Machine** for sinking wells i alluvial deposits in River Bottoms, Sea Marshes, &c. It has a worm feed-out for f down the tubing as the hole is bored, and a brake and lever on the same shaft and sam for lowering the tube rapidly. This is a very powerful machine. It has reverse geari turning the pipe backwards and forwards, which is operated by a lever in the platform. driven by a chain that goes onto the wheel I, that turns the shaft J and spool S. It als lever and a clutch gearing for stopping and starting. The frame extends back farther shown in the picture. This is just the machine that is required where there is no hard r be drilled, and it is suitable for penetrating all alluvial deposits, quicksand, clay, sla soft rocky formations.

DIMENSIONS AND PRICES OF FIG. 1289.

Size of Pipe in inches it will sink....................	1 to 4	1¼ to 6	1¼ to 8	2 to 10	2½ to 12
Depth in feet it will sink a pipe....................	1000	1000	1500	2000	2500
Size of swivel furnished....................	1¼	2	2½	2½	2½
Price Fig. 1289 including Ball Bearing Swivel, F, D, Casing Head B, and one Wrench....................	$400 00	$500 00	$625 00	$750 00	$875 00

For general information please examine the Revolving department of our Encyclopedia for 1892, other departments for other knowledge.

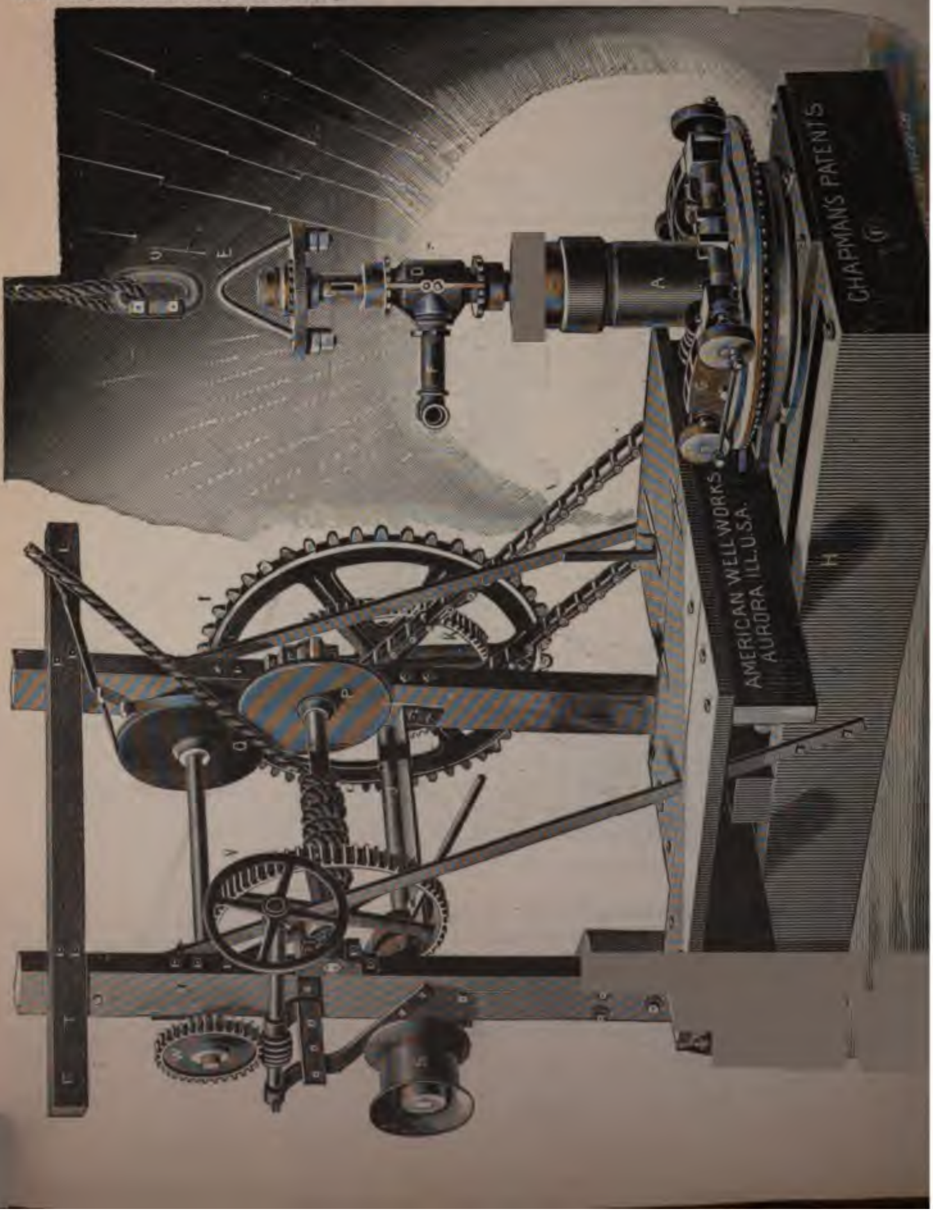
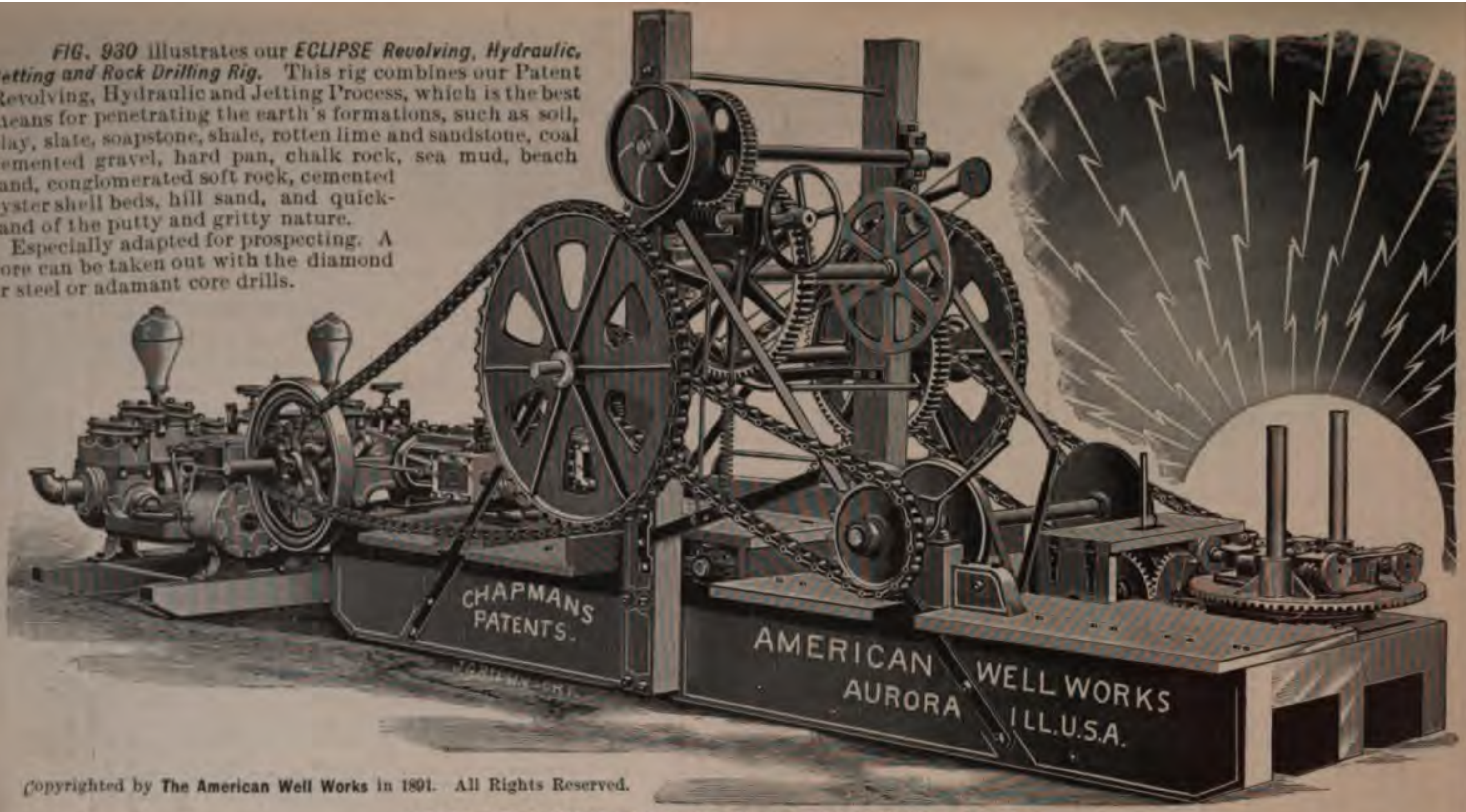


FIG. 930 illustrates our ***ECLIPSE Revolving, Hydraulic, Jetting and Rock Drilling Rig.*** This rig combines our Patent Revolving, Hydraulic and Jetting Process, which is the best means for penetrating the earth's formations, such as soil, clay, slate, soapstone, shale, rotten lime and sandstone, coal cemented gravel, hard pan, chalk rock, sea mud, beach sand, conglomerated soft rock, cemented oyster shell beds, hill sand, and quicksand of the putty and gritty nature.

Especially adapted for prospecting. A core can be taken out with the diamond or steel or adamant core drills.



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PRICES FOR THIS RIG ARE ON THE FOLLOWING PAGES.

FIG. 930 illustrates our Revolving, Hydraulic Jetting Rig, using our patented processes for sinking wells, which are the best means for penetrating the alluvial formations. It has an elliptical rock drilling motion, as shown on Fig. 924, which lifts the drill slowly to economize power and drops it with *lightning speed, striking a tremendous blow* that cuts the rock rapidly. With this rig, the earth is penetrated expeditiously. When great depths of quartz, granite, or adamantine rocks are to be drilled, our wood poles should be used.

For list of tools, see list of Fig. 924.

Machines that have been produced by the inventive genius of our engineers, combined with the best of materials used in their construction, have won for us the most honorable distinction in our line.

The object sought in producing this Engine, is to make a machine that will penetrate any material found in the earth, and be practically used by ordinary intelligent people who have had no experience in sinking wells.

This machine is protected by patents: Nos. 309,926, 309,927, 371,548, 373,440, 382,689, 443,069, 443,070, 443,071, 443,072, 541,835.

Complete List of Tools to be Used with Figs. 924 and 930 for ELLIPTICAL DRILLING, ROTARY, JETTING AND HYDRAULIC WORK.

2 Duplex Steam Pumps, with Lubricators, Oil Cups, Pet Cocks, Suction and Discharge Fittings and Valves to Hose, and two 10-ft. Suction Pipes.
2 25-ft. lg'ths Hose and Couplings.
1 Rotary (Reverse Motion), in Machine or separate.
1 " Wrench.
2 " Steel Shoes (2 sizes).
2 " Turning Posts.
4 " Cast Casing Heads, (2 sizes.)
2 " Bush'g Bars.
2 Fig. 1024 Revolving Drills (2 sizes.)
2 " 925 Ball Bearing Swivels.
1 Pr. Fig. 1230 Pipe Turning Clamps.
2 Hydraulic Drill Bars and Couplings, (2 sizes.)
1 Fig. 362 Pipe Dog.
1 " 559 Rod Turner.
1 " 331 Drilling Swivel.
2 " 602 Force Exp. Drills, (2 Sizes.)

2 Forged Drilling Bush.
2 Fig. 745 Hyd. Z Drills, (2 sizes.)
1 " 771 Drive Block.
1 " 561 Forged Drive Plate.
2 " 753 " " Heads, (2 sizes.)
4 " 35 Jack Screws.
1 " 11 Pipe Puller.
2 " 518 C Hooks.
1 " 234 Pipe Vise.
1 " 1325 Adjustable Die Stock.
1 " 34 Solid Die Stock and Dies.
1 " 764 Screw Grab.
960 ft. X Heavy Drill Rods and Couplings.
500 ft. Pure Manilla Rope.
1 1-Sheave Pulley Block, with Guide.
2 2-Sheave Twinned Pulley Blocks, with Guides and Becket.
1 3-Sheave Pulley Block with Guides and Becket.
1 Pulley Swivel.
1 Spring Grab.
1 Friction Grab.
1 No. 2 Pipe Cutter.
2 Prs. Chain Tongs, Fig. 1376.

4 Prs. Adj. Pipe Tongs, Fig. 80.
1 Pr. Slide Tongs.
1 B. S. Forge.
1 Anvil.
1 12 lb. Sledge.
1 B. S. Hammer.
2 Prs. B. S. Tongs.
1 Combination Vise.
2 Cold Chisels.
2 Handled Cold Chisels.
1 Flatter.
1 Fuller.
1 Hardy.
1 Set 6 Files.
1 B. S. Post Drill, Fig. 853.
6 Drills.
1 Saw.
1 Hatchet.
1 Ax.
1 Claw Hammer.
1 Universal Brace, 6 Bits.
1 Square.
1 2-ft. Rule.
1 50-ft. Tape Line.
3 Wood Chisels.
1 Draw Knife.
2 Tool Boxes and Locks.

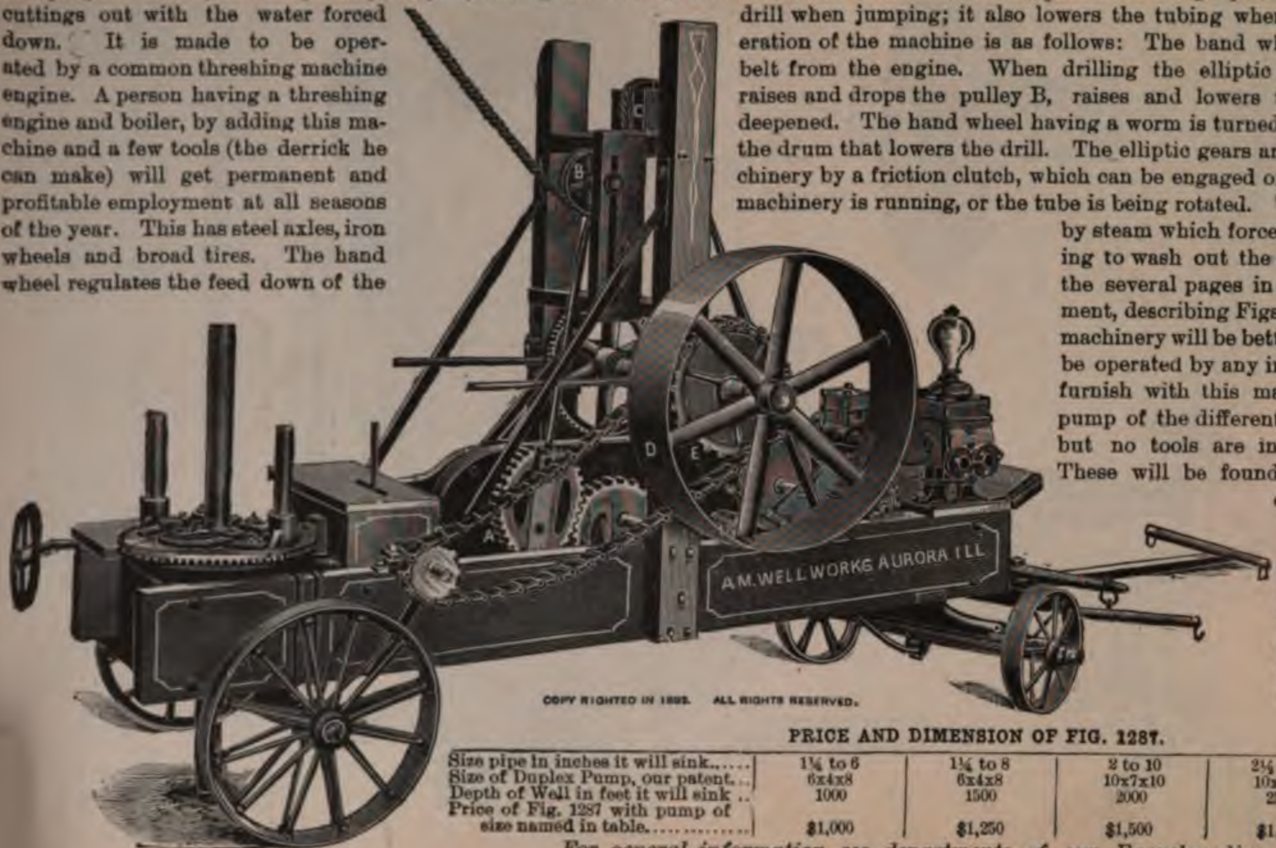
LIST PRICES, FIGS. 924 AND 930 MACHINE, POWER AND TOOLS.

(Add 20% of its List Price for Mounting Machine: also 20% of its List Price for Mounting Boiler.)

No. of Outfit.	Depth well will sink in feet.	Size Drilling Tools in inches. (Rotary turns pipe of largest size mentioned to 2 inches.)	Horse Power Boiler required.	Horse Power Engine required.	Price improved Fig. 924 Machine only. (unmounted.) No Pumps	Price Improved Fig. 930 Machine only. (unmounted.) No Pumps nor Engines.	Price Engine and Boiler. (On Skids.)	Price Improved Fig. 924 Machine, Boiler, Engine and complete list of Tools. (unmounted.)	Price Improved Fig. 930 Machine, Boiler, Double Engines, (Geared to Machine) and complete list tools, (unmounted.)
1	1000	3-4½ If stratification requires reduction below two sizes, add smaller tools.	20	12	$800.00	$..........	$496.00	$2188.00	$..........
2	"	3½-5	20	12	800.00	....	496.00	2648.00	....
3	"	4½-6	20	15	800.00	....	524.00	2839.00	....
4	"	5-7	20	15	908.00	....	524.00	3464.00	....
5	"	6-8	20	15	960.00	....	521.00	3964.00	....
6	"	7-9	25	16	960.00	....	580.00	4348.00	....
7	"	8-10	25	16	1068.00	....	580.00	4788.00	....
8	"	9-12	25	16	1218.00	....	580.00	5072.00	....
9	"	12-15	40	22	1260.00	....	752.00	6324.00	....
10	1500	6-8	25	16	....	1276.00	524.00	....	3980.00
11	2000	7-9	30	25	....	1336.00	580.00	....	4724.00
12	2500	9-12	40	25	....	1468.00	580.00	....	5292.00
13	3000	12-15	50	30	....	1668.00	928.00	....	6908.00

IN ASKING FOR PRICES, STATE SIZE OF PIPES YOU WISH TO USE.
Any tools may be added to this List, or deducted, as required: prices will be made accordingly.
For drilling deep holes in hard rock, add Pole Drilling Attachment and Tools: see list and prices elsewhere.
Rotary principle in these outfits will sink pipe in soft formations to greater depth than outfits are listed.
1000 feet only of drill rods listed with any of these outfits.

Fig. 1287 is an illustration of our DAKOTA STEAM DRILLER. It is copied from a photograph of a machine made for Messrs. Cooper & Borah. They were not familiar with the well business, but with it they sunk their first well, a 4½ inch 885 feet in 30 days of 8 hours per day, and got an immense flow of water. They used four of our patent processes in sinking this well, viz: the Hydraulic, Jetting, Revolving and Jumping the drill by the Elliptical principles, forcing a stream of water down the drill rods, sinking the well tubing by rotating, and washing the cuttings out with the water forced down. It is made to be operated by a common threshing machine engine. A person having a threshing engine and boiler, by adding this machine and a few tools (the derrick he can make) will get permanent and profitable employment at all seasons of the year. This has steel axles, iron wheels and broad tires. The hand wheel regulates the feed down of the drill when jumping; it also lowers the tubing when revolving. The operation of the machine is as follows: The band wheel D is turned by a belt from the engine. When drilling the elliptic gears revolve, which raises and drops the pulley B, raises and lowers the drill as the hole is deepened. The hand wheel having a worm is turned to unwind the rope on the drum that lowers the drill. The elliptic gears are engaged to the machinery by a friction clutch, which can be engaged or disengaged while the machinery is running, or the tube is being rotated. The pump is operated by steam which forces water down the tubing to wash out the cuttings. By reading the several pages in the revolving department, describing Figs. 924, 930, 934, 1286, the machinery will be better understood. It can be operated by any intelligent person. We furnish with this machine a duplex steam pump of the different sizes shown in table, but no tools are included in the prices. These will be found described and priced on other pages.


A.M. WELL WORKS AURORA ILL.
A
B
D
E

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The above parties sunk their second well 845 feet in 13 days of 10 hours each, and say our Machinery exceeds their expectations.

PRICE AND DIMENSION OF FIG. 1287.

Size pipe in inches it will sink......	1¼ to 6	1¼ to 8	2 to 10	2¼ to 12	2½ to 15
Size of Duplex Pump, our patent...	6x4x8	6x4x8	10x7x10	10x7x10	10x7x10
Depth of Well in feet it will sink ..	1000	1500	2000	2500	3000
Price of Fig. 1287 with pump of size named in table...............	$1,000	$1,250	$1,500	$1,750	$2,000

For general information see departments of our Encyclopedia

Chapman's Patent Single Gear Rotary.

Fig. 1228 shows one of our Chapman's Patent Revolving Process Machines for sinking wells revolving the pipe which forms casing of well. It bores the hole, sinks the pipe and connects well casing. It has a clutch for starting and stopping. It revolves on ball bearings. Gripping turn, permitting pipe to sink as bore is deepened. This machine is for turning the pipe only.

Furnished:—
Machine only,
2 posts and 1 wrench.

(Swivel, head and pipe
are not included.)

For operation, and for hoisting appliances tools, see description of "Lightning Revolvin Process," and Figs. 146, 147 and 352. By th process wells have been sunk 3067 ft. throug quicksand and soft materials. Six to eight wells have been sunk 1100 to 1200 ft. in 30 hour

Fig. 123.

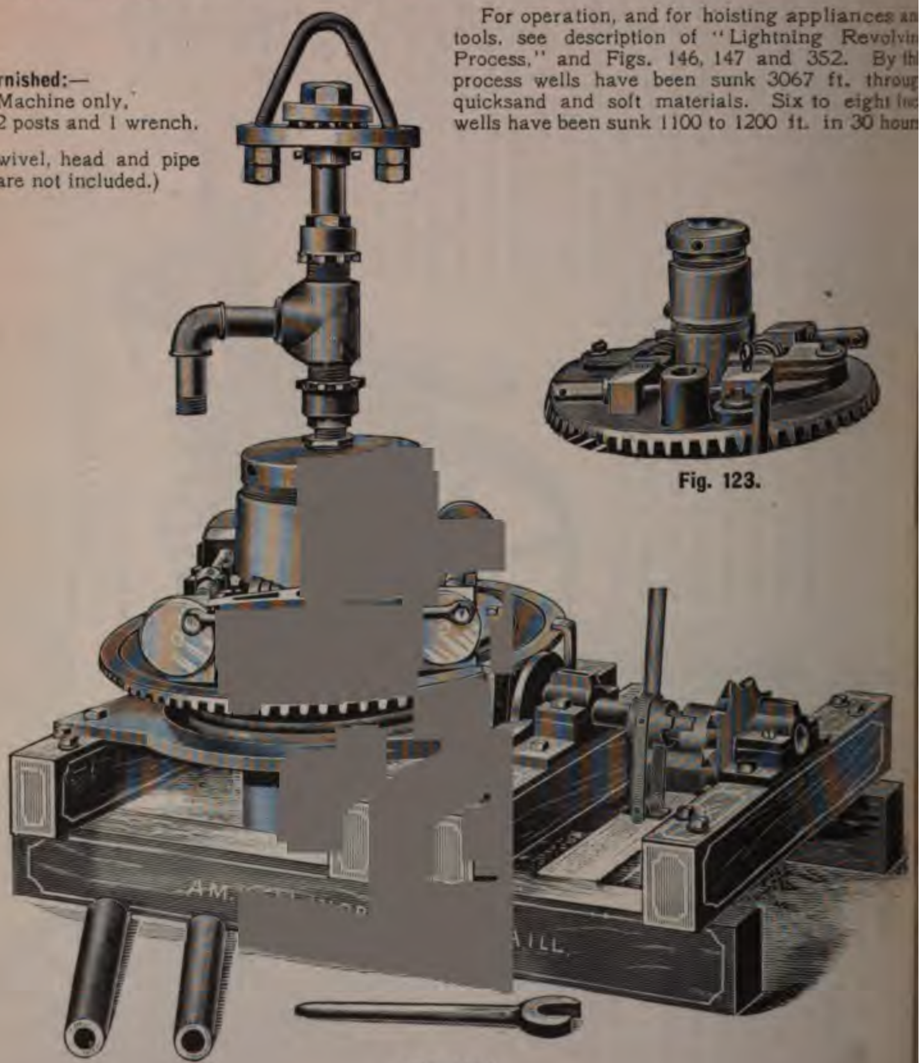


Fig. 1228.

PRICES FIG. 1228 ROTARY MACHINES.

Number	1*	2*	3†	4†	5	6	7‡
Pipe Sinks, In.	**3 to 1**	**4 to 1**	**6 to 1¼**	**8 to 1¼**	**10 to 2**	**12 to 2½**	**15 to**
No. of Sprocket Wheel	75	75	103	103	103	103	103
Sprocket Wheel Teeth	11	11	9	9	9	9	12
Code	Rast	Ratz	Rant	Raps	Rarn	Rasp	Rau
Price	**$125.**	**$140.**	**$230.**	**$320.**	**$430.**	**$535.**	**$710.**

(*) Has table Like Fig. 123. (†) Has post lugs cast on table. (‡) Has double pivoted gripping ja

Chapman's Patent Reversible Rotary.

Fig. 1229 shows Chapman's Patent Reversible Rotary Well Sinking Machine Attachment for sinking wells by revolving the pipe which forms casing of well. It bores the hole, sinks the pipe and connects the well casing. It revolves on ball bearings. Gripping jaws turn, permitting pipe to sink as bore is deepened. Is reversible for connecting and disconnecting boring pipes quickly, as necessary in sinking through quicksand.

For operation and for hoisting appliances and tools used, see description "Lightning Revolving Process," and Figs. 146, 147 and 352. Wells by this process have been sunk 3067 ft. through quicksand and soft materials. Six to eight inch wells have been sunk 1100 to 1200 ft. in 30 hours.

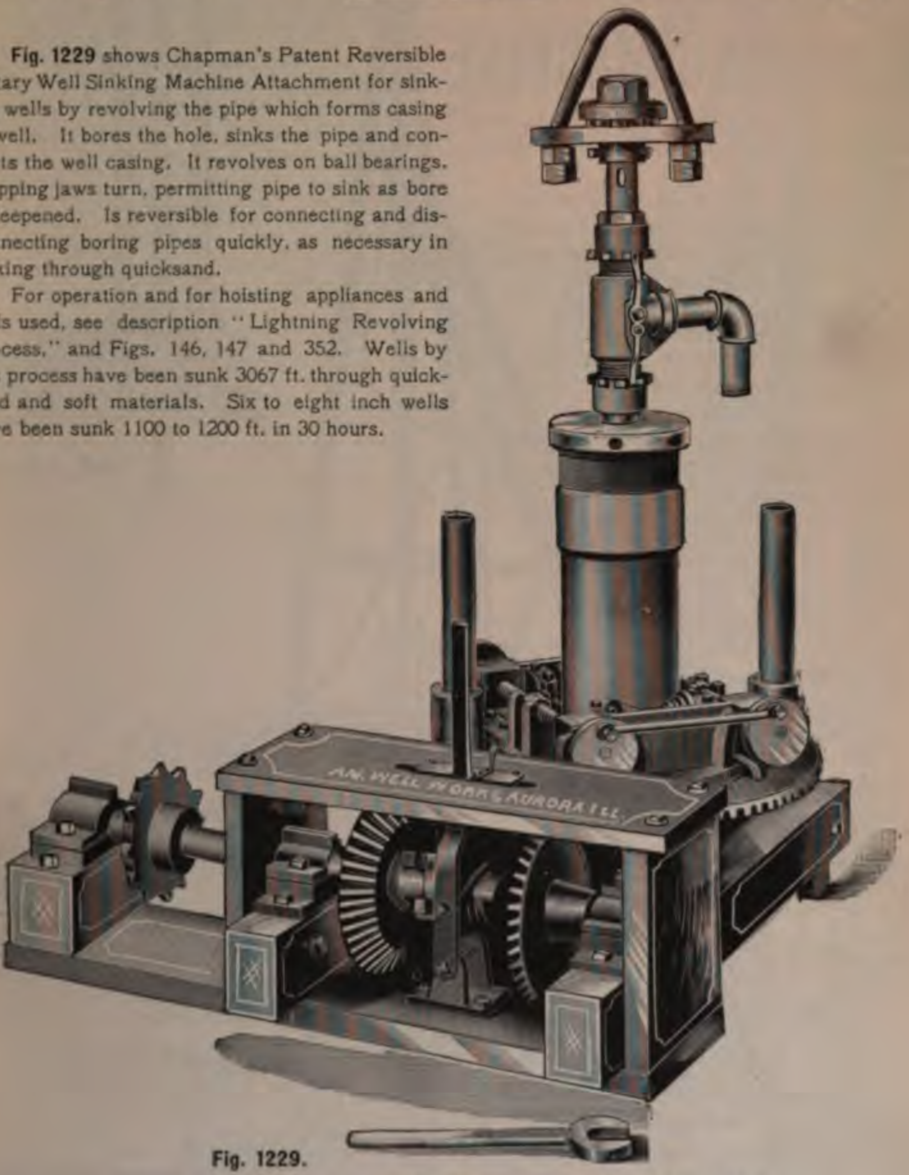

A.W. WELL WORKS, AURORA, ILL.

Fig. 1229.

PRICES FIG. 1229 REVERSIBLE ROTARY MACHINE,
Include Machine only, 2 posts, 1 wrench. Swivel, connections and pipe not included.

Number	1*	2*	3	4	5†
Pipe sinks In.	**6 to 1¼**	**8 to 1¼**	**10 to 2**	**12 to 2½**	**15 to 2½**
No. of Sprocket Wheel	103	103	103	103	103
Sprocket Wheel teeth	9	9	9	9	12
Code	Raav	Rawl	Razy	Reab	Reac
Price	**$260.**	**$370.**	**$490.**	**$610.**	**$800.**

(*) Has post lugs cast on table. (†) Has double pivoted gripping jaws.

FIG. 399.

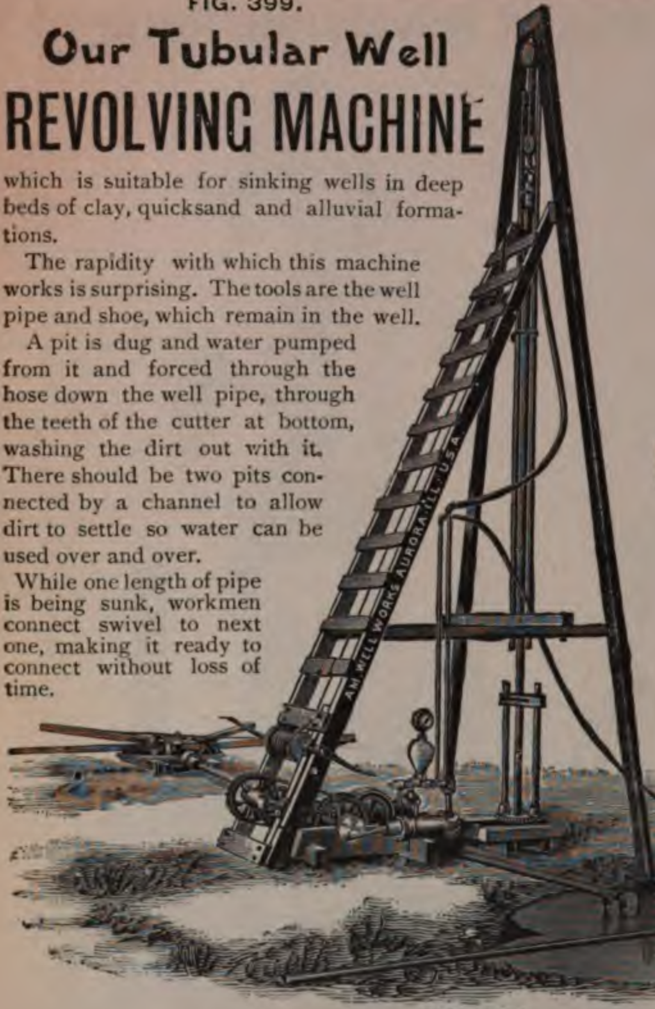
Our Tubular Well
REVOLVING MACHINE

which is suitable for sinking wells in deep beds of clay, quicksand and alluvial formations.

The rapidity with which this machine works is surprising. The tools are the well pipe and shoe, which remain in the well.

A pit is dug and water pumped from it and forced through the hose down the well pipe, through the teeth of the cutter at bottom, washing the dirt out with it. There should be two pits connected by a channel to allow dirt to settle so water can be used over and over.

While one length of pipe is being sunk, workmen connect swivel to next one, making it ready to connect without loss of time.


AM. WELL WORKS AURORA, ILL. U.S.A.

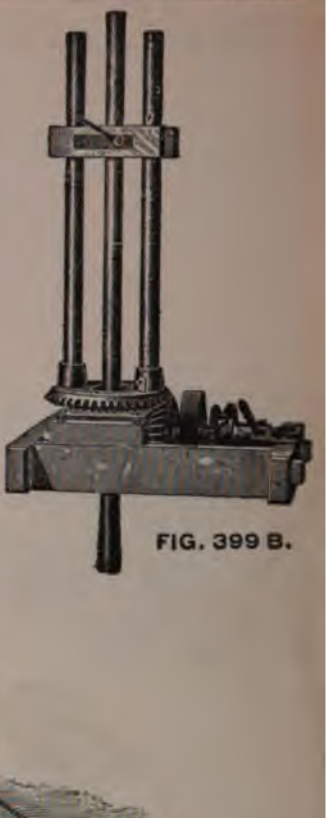


FIG. 399 B.

FIG. 399.

Wells have been completed in the time as follows with this principle:

300 foot well completed in one day.
160 foot well conpleted in one day.
145 foot well completed in one day.
220 foot well completed in five hours.
125 foot well completed in two hours.

This Rig, Fig. 399, and outfit consists of:—

1 Revolving Machine.
2 Set Pipe Turning Clamps,
Horse Power,
Sweeps and Lead Poles,
Derrick,
150 feet Guys with Loops,
4 Iron Stakes,
Pumping Jack,
Friction Drum Hoist,
Hand Let-out and Ratchet,
2 Swivels, Fig. 744,
1 Swivel Guide,
2 16 ft. Lengths of Hose, with Couplings,
2 Supply Pipes and Cocks,
100 ft. 1 in. Manilla Rope,
1 1-Sheave Pulley,
1 2-Sheave Pulley,
1 Pressure Gauge,
2 Hand Cranks,
1 Drum, Ratchet and Friction,
4 Pair Adjustable Pipe Tongs,
1 Set Die Stock and Dies, Fig. 34, to cut 1 and 2 in. pipe,
1 Pipe Cutter for cutting off ¾ to 2 in. pipe,
1 Pipe Vise for holding ¾ to 2 in. pipe,
200 feet of 1-in. pipe for tools,
1 Screen Tube Grab,
2 Brass Piston Pumps,
1 Suction Pipe.

PRICES FIG. 399.

No. of outfit	347	348
Size of pipe it will sink	2 to 3	2 to 3
Depth of well it will sink	300	500
No. of horse power furnished	2	4
Size of pump furnished two of them	4	5
Price of Fig. 399 with above list of *tools complete*	$ 275 00	$ 350 00

PRICES 399 B ONLY.

No. 1,	2 in. only	$38 00
" 2,	2 to 3 in.	50 00
" 3,	2 to 4½ in.	90 00

With Reverse gear and clutch like that shown in Fig. 579, increase list prices 40 per cent.

Fig. 1646 is made from a photograph of our **Mounted Tubular Well Sinking Machine.** It sinks the well by turning a pipe and washing the borings out with a stream of water forced in through the pipe that is turned. The water can be used over and over again as shown by Fig. 399. It bores a hole through clay and alluvial formations for getting water.

The derrick is of our folding pattern, and when folded up for moving, it is like Fig. 1598. The revolver for turning the pipe can be attached to the back end of the wagon for moving, or we will hinge it to the derrick if preferred.

This is the quickest method for sinking a well. A diaphragm prevents the sediment from injuring the valves and wearing the pump.

Wells have been sunk in the following time with this machine:

300 foot well completed in one day.
160 foot well completed in one day.
145 foot well completed in one day.
220 foot well completed in five hours.
125 foot well completed in two hours.

The casing for the well may be used for turning the boring tool, leaving casing down the well and the hole clean and cased as soon as water is reached.

The rapidity with which this machine sinks a well is surprising.

A pit is dug and water pumped from it and forced through the hose down the well pipe, through the teeth of the cutter at bottom, washing the dirt out with it. There should be two pits connected by a channel to allow dirt to settle so water can be used over and over.

While one length of pipe is being sunk, connect swivel to next one, making it ready to connect without loss of time.

LIST WITH FIG. 1646. MAKING OUTFITS 370 AND 371 CONSISTING OF:

1 Machine and Derrick on steel wheels.
1 Revolving Machine, Horse Power, Sweeps and Lead-poles
1 Set Turning Clamps.
150 Ft. Guy Cable Wire with Loops.
4 Iron Stakes.
2 Brass Piston Diaphragm Pumps.
1 Suction Hose.
1 Friction Drum Hoist.
1 Hand Hoist and Let-out.
2 Water Swivels.
Set Swivel Guides.
2 25 Ft. Lengths of Hose.
2 Supply Pipes and Cocks.
100 Ft. 1-in. Manilla Rope.
1 1-Sheave Pulley.
1 2 " "
1 Pressure Gauge.
2 Hand Cranks.
1 Drum, Ratchet and Friction.
4 Pair Adjustable Pipe Tongs.
1 Die Stock and Dies, Fig. 34, to thread 1 and 2-in. Pipe.
1 ¾ to 2-in. Pipe Cutter.
1¾ to 2-in. Pipe Vise.
200 Ft. 1-in. Pipe for Tools.
1 Screen Tube Grab.

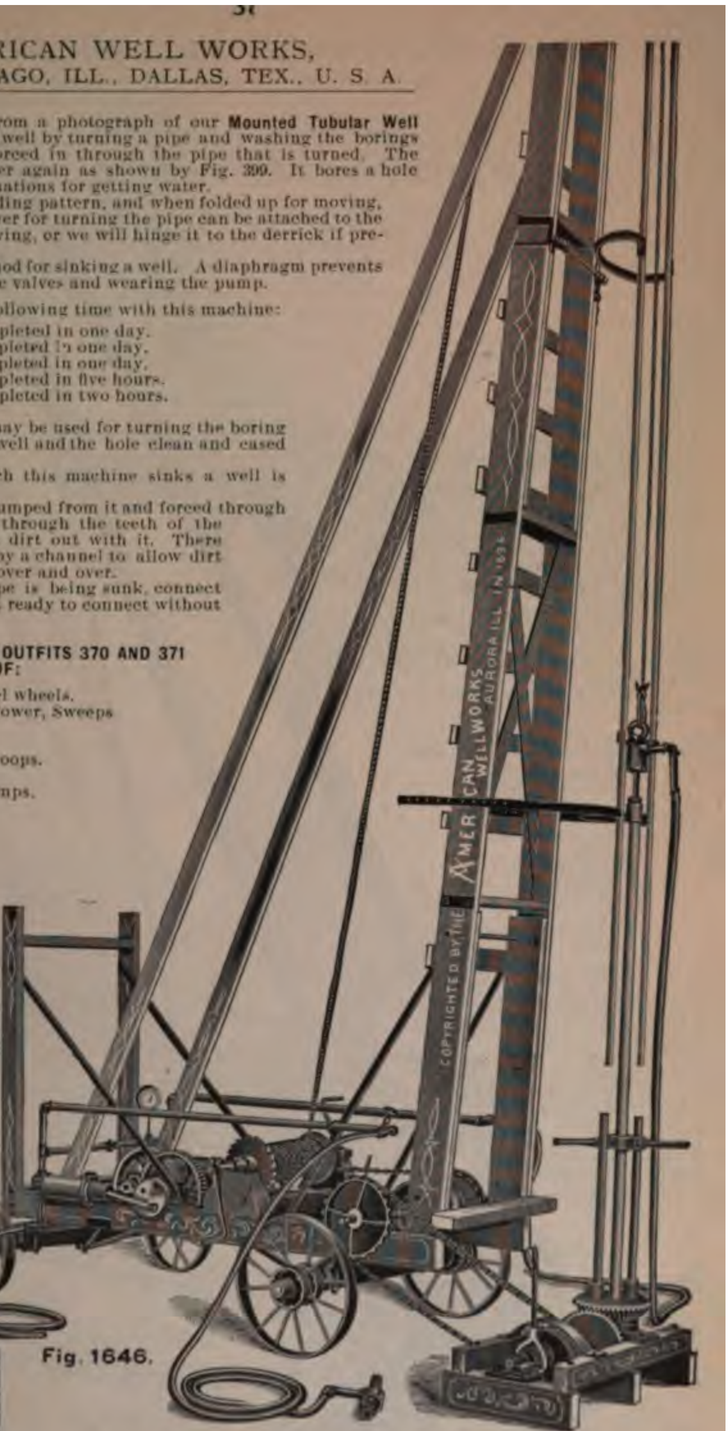


Fig. 1646.

Fig. 1577 shows our

AURORA MOUNTED STANDARD GASOLINE OR GAS ENGINE.

For Well Drilling, Etc.

A gasoline engine for driving this machinery will be mounted on the rig when required. See Figs. 1586 and 1599, or any of our Gasoline Engines.

PRICES FOR FIG. 1646 WITH LIST.

No. of outfit	370	371
Size of Wrought Iron Pipe it will sink, inches	2 to 3	2 to 3
Depth well it will sink in feet	300	500
No. of Horse Power furnished	2	4
Size Diaphragm Pumps furnished, inches	5	6
Price of **Fig. 1646** with list of tools	[illegible]	[illegible]

Fig 1344 illustrates our improved HERCULES DRILLING RIG. This rig has been PERFECTED by EXPERIENCES AND SUGGESTIONS from the large number of drillers that we have made machines for. This is designed to be used by horse power. It is furnished with two tumbling rods, and our horse power (Fig. 931.) A similar rig set up in operation is shown by Fig. 788. Great improvements have been made in drilling tools. The art of building is not possessed by cross road blacksmith shops, or a one-horse foundry, who seek to imitate these machines as made by us. This was taken from a photograph of a machine, the drill leaning against the derrick (not shown in this picture.)

Please note the most beautiful arrangement ever used in drilling rigs—is the worm feed. You can raise the tools or lower them. It slides back as shown, out of mesh with the worm gear when the tools are being hoisted. It is our Patent Endless Temper Screw. The throw-out levers, brakes and sand-pump hoisting adjustments are convenient to the operator. The hand-wheel with the worm lowers the drill as the hole is sunk; a ball and lever on the opposite side of the machine (not shown) throws the hoisting gear for lifting the tools into action. The lever at the right operates the brake. The first lever at the left on the bottom sill is a foot lever that operates the brake. The other lever by its side throws the block forward that holds the treadle away from the cam, which stops the drilling. The cam runs all the time. The lever by the side of the hand-wheel at the left operates the sand-pump by friction, so if it catches no injury can come to it. You will find this the handiest machine made, and the whole machine can be operated within reach of the driller when turning the drill.

The improvements as shown here are used on Figs. 184, 601 and 788. We will also furnish it with a steel frame, steel axles and iron wheels, when required, for a small additional charge.

It is fully warranted and you will like it.

List of Articles furnished with Fig. 1344:

1 Drilling machine.
1 Tongue, 1 set Whipple trees, 1 Neck Yoke, when machine is mounted.
1 Down horse power.
2 T. Rods.
3 Knuckles.
1 T. R. Rest.
8 H. P. Stakes.
4 Links.
Lead poles required.
1 Derrick.
2 Braces.
Derrick bolts and washers, Hawser Cable for d'pth, Sand Line for d'pth
1 Loop Eye.
1 Drill Bar.
2 6" Z Drills.
1 Drill Gauge.
2 Drill wrenches.
1 Iron sand pump.
1 15" M. wrench.
1 Oil can.
8 extra chain links
1 sledge. 1 tool box
1 Cold chisel.

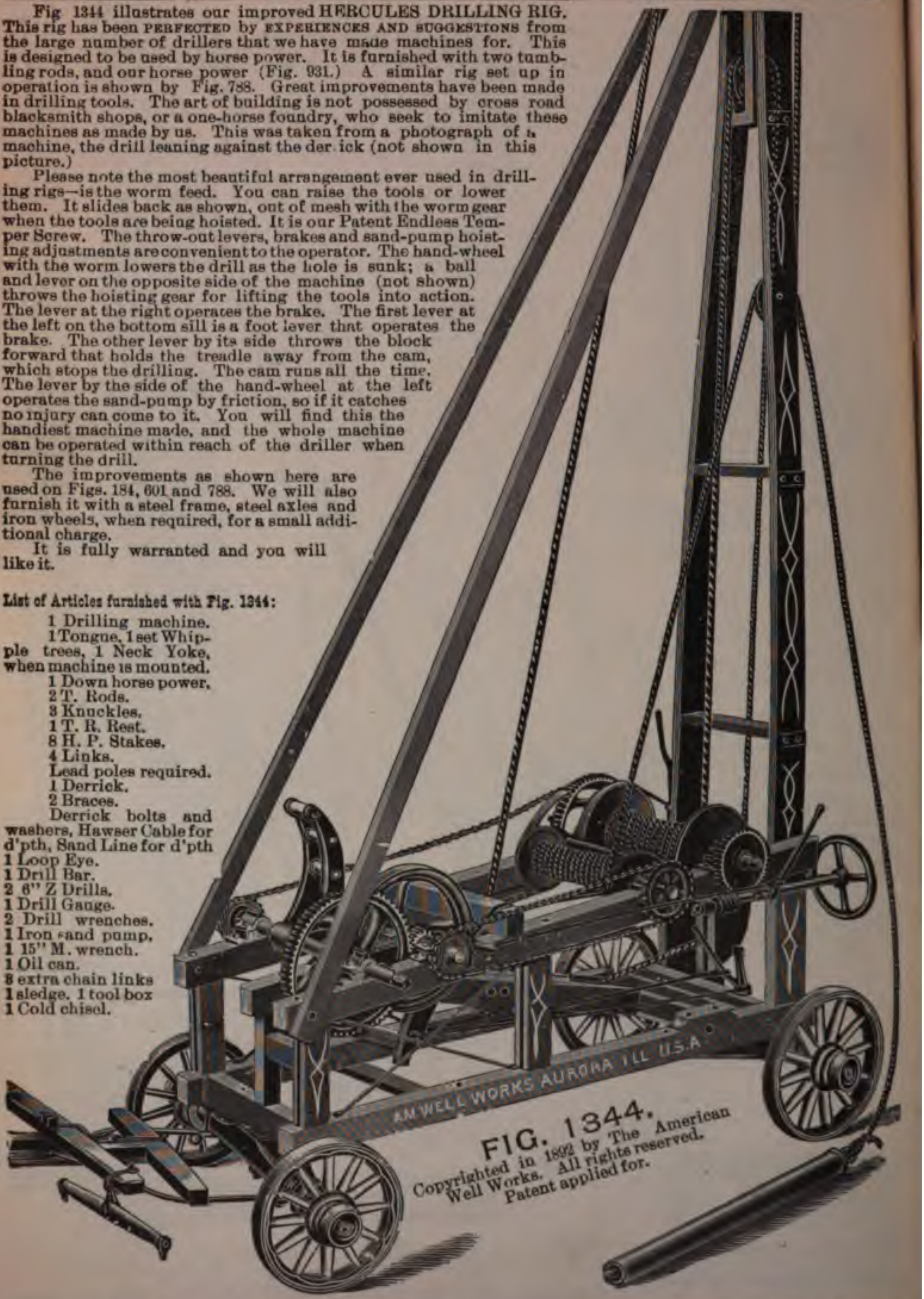

AM WELL WORKS AURORA ILL U.S.A

FIG. 1344.
Copyrighted in 1892 by The American Well Works. All rights reserved. Patent applied for.

No. of Outfit.	Depth, provided with rope to drill.	Price, not mounted.	Price, mounted.	No. of Outfit.	Depth, provided with rope to drill	Price, not mounted.	Price, mounted.
349	250	....	$500				
350	350	$450	....	353	600	$600	....
351	500	480	....				
352	*500*	....	530	354	600	....	$700

Add for Jars, $60. Jars are included with Outfits 353 and 354.

THE AMERICAN WELL WORKS

STEEL MOUNTED

HERCULES STEAM DRILL.

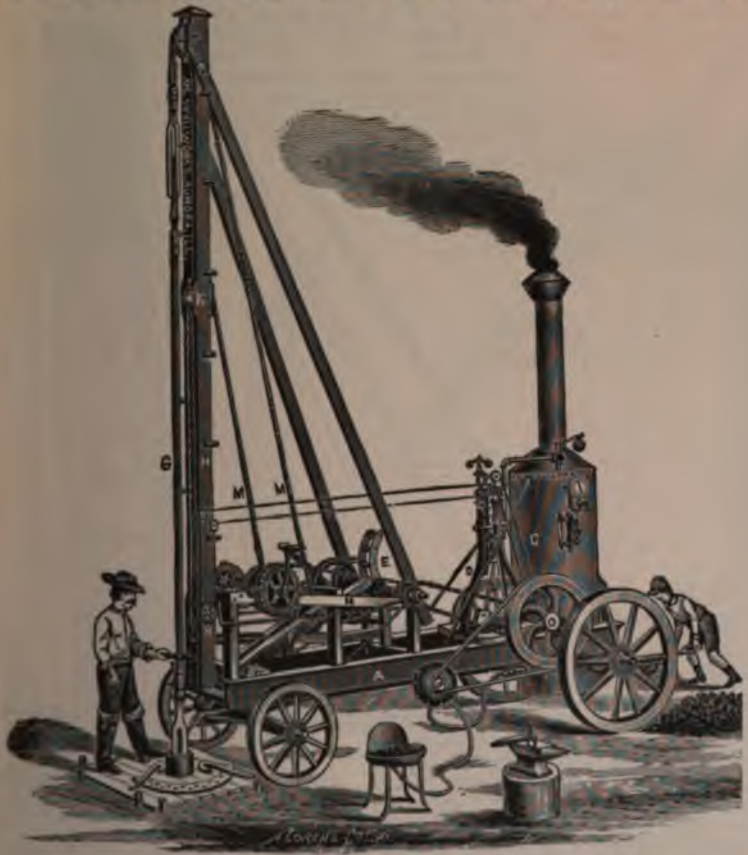


Fig. 601.

NOTICE.—The driller can stop, start or regulate the Engine while standing turning the drill, by the use of Pulley N.

Tools Furnished with Mounted Hercules Steam Rig.

1 Drilling Machine and Engine, complete, with Taper Screw Joints.
1 Set of Jars.
1 Drill Bar.
Hawser Cable.
2 Drill Wrenches.
1 Loop.
1 Sand Bucket.
2 Cold Chisels.
1 Forge.

1 Alligator Wrench.
1 Tool Box.
1 Sledge.
2 Monkey Wrenches.
1 Hammer.
1 Oil Can.
2 Six-inch Z Drills.
1 Anvil.
1 Rope Turner.
Sand Pump Rope.

PRICES.

Outfit 158, for 250 feet.	$ 900 00
Outfit 159, for 350 feet,	1,000 00
Outfit 160, for 500 feet,	1,200 00
Outfit 161, for 600 feet,	1,400 00

Cable Elliptical Drilling Machine

Fig. 105 shows our Portable Steam Driven Elliptical Drop Manila Cable Drilling Machine for sinking holes in rock and solid formations for water, oil or minerals. Rear axle carrying boiler and all wheels are steel, heavy, as required for drilling machines. Boiler has submerged flues. Drilling motion is our celebrated elliptical drop, raises drill slowly, drops it quickly. Main cable handles tools in and out of well. Drilling cable on separate drum, having *endless worm feed* (beats any temper screw) runs over lower sheave, and does the drilling, gripping main cable by clamps shown. This prevents wear of main cable, and when short drilling cable is worn out, a few feet of new cable only is required. Machine has frictions and clutches conveniently arranged. Derrick folds down upon machine for moving, and is raised and lowered by engine. These machines in modified form for jetting work—see adjacent pages. **See "List Rock Tools"** on another page to get for use with this machine. **Furnished:**–Tongue, whiffletrees and neckyoke, short drilling cable and clamps.

(Main drilling cable, sand line, sand pump and cat-head, are not included in machine.)

‡Build four-post derrick for 750 to 1000 ft. work.

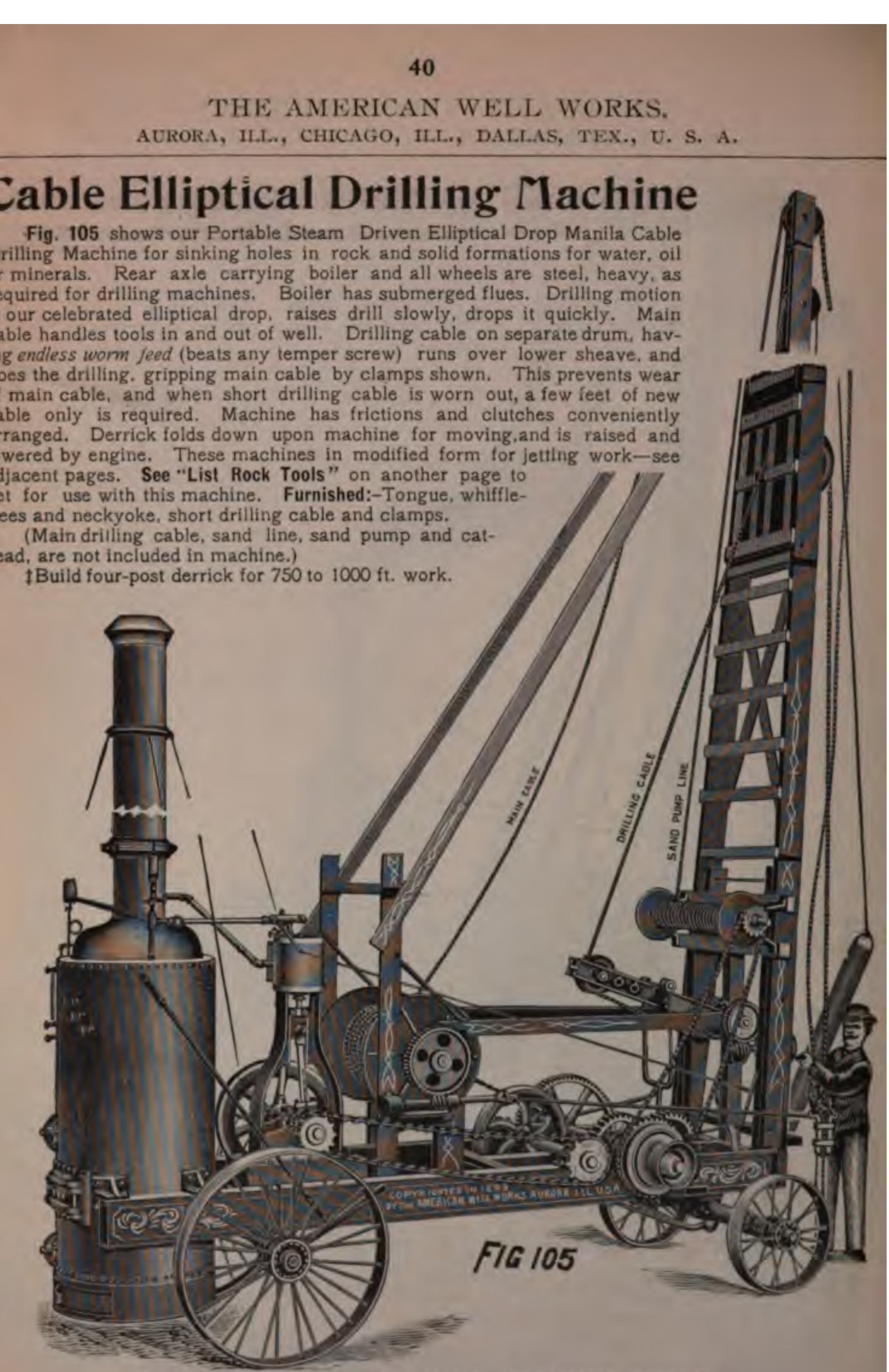


FIG 105

PRICES, FIG. 105 MACHINE, WITHOUT TOOLS.

No.	Depth Drills*.	H. P. Boiler.	H. P. Reversible Engine.	Range Drills used†.	Use Tools weight of. Lbs	Use Manila Cable.	Code.	Price without Tools.
1	300	6	5	4 to 6	500 to 850	1¼	Ragg°	$ 750.
2	500	8	6	4 " 8	600 " 1100	1¼	Rajo	860.
3	750	10	8	4 " 8	800 " 1400	1½	Ralm	1110.
4 ‡	1000	12	10	5 " 10	1000 " 1600	1½	Ramp	1340.

*Refers to cable will handle, and depth drills with medium and lighter weight tools.
†*Larger drills mentioned* are used on **short cable** shallow work, and to start deep holes.

Double Walking Beam Machine.

Fig. 145 shows our Double Walking Beam Steam Cable Drilling Machine for sinking wells; mineral, oil or gas holes.

Machine as shown is ready for drilling. To spud, string cable as per dotted lines and throw beams back. It drives pipe with tools furnished. When tools are drawn up, double beams are thrown back from over well by lever at side. One movement of lever changes machine from drilling to hoisting tools and vice versa, or stops it. Tools are lowered by friction, and when "buried" are connected to temper screw as shown

aper Joint Tools Furnished with Fig. 145.

H. L. Cable, depth.
Sand line, "
1 Temper Screw.
1 Rope Socket.
1 Jars, F. 1631.
Drill Bar, F. 1644.
2 Drills, 6 In. F. 605.
" 8 In. "
2 Hvy Tool Wrenches
1 Ch Wrench Lever.
2 Drill Gauges.
1 Driving Clamps.
1 6 In. Drive Head.
1 Sand Pump, F. 135
1 Blower, F. 1674.
1 " Hose.
1 Tuyere Iron.
1 Anvil Billet & Blk.
1 Steel Sledge.
1 15 In. M. Wrench
1 B. S. Hammer.
2 Pr. B. S. Tongs.

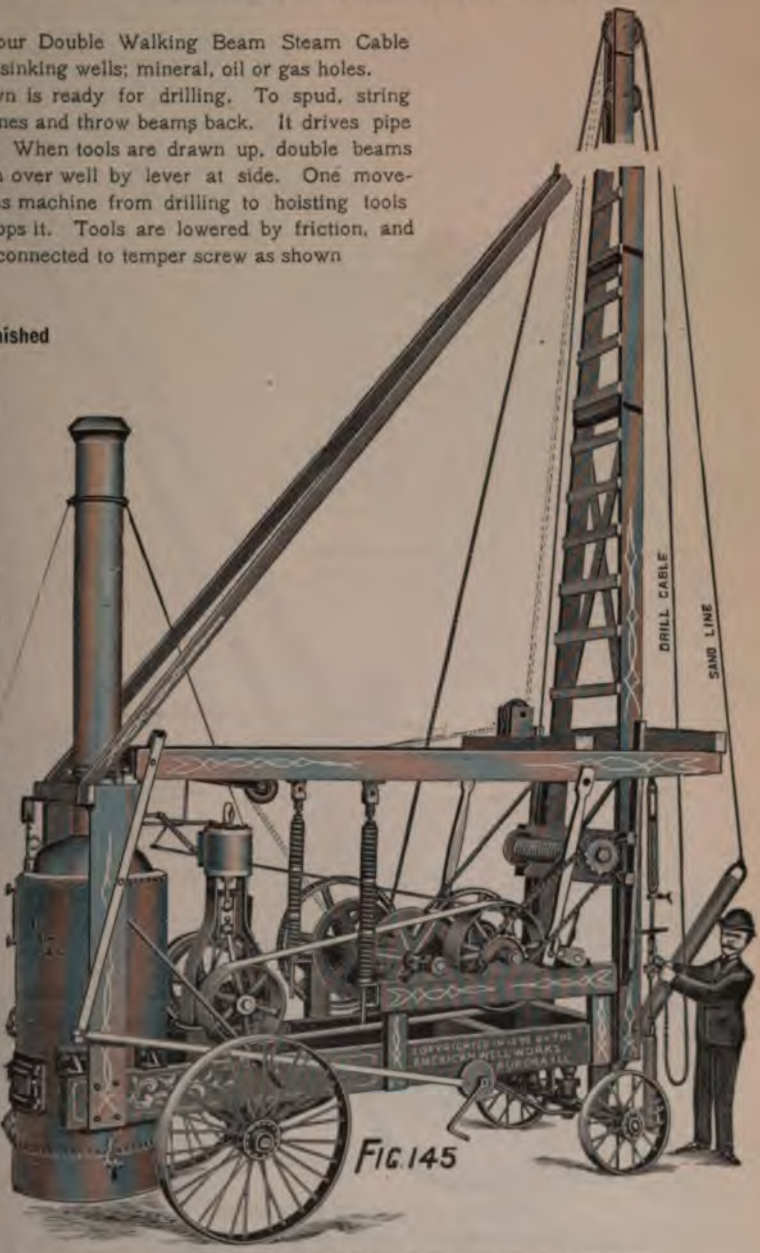


FIG. 145

PRICES FIG. 145 DRILLING MACHINE AND TOOLS LISTED.

No.	Depth Drills.	H. P. Boiler.	H. P. Eng.	Use Tools, Wt. of. Lbs.	Apx. Wts. Mach	Code.	Price. With Tools.
1	300	6	5	500–850	6600	Remp	**$870.**
2	500	8	6	600–1100	8000	Reny	**980.**
3	800	10	8	800–1400	9000	Reol	**1200.**
4	1200	12	10	1000–1600	10200	Rept	**1520.**

Steel Cable Elliptical Machine.

Fig. 103 shows our Portable, Gasoline Engine Driven, Elliptical Drop, Steel Cable Drilling Machine, for sinking holes in rock and solid formations for water, oil or minerals. Engine is mounted on rear end of frame, complete, with gasoline tank, battery, water circulation pump. Water circulation tank (not shown) stands at side when drilling, and is connected to circulation pump. Rear axle and all wheels are of steel, making heavy, strong trucks needed for drilling machines. Friction clutch pulley permits starting and running engine without running machine. Drilling motion is our celebrated elliptical drop, raises drill slowly, drops it quickly. Main cable is steel. The drilling feed out cable shown is used for drilling, grips the steel drill cable with specially designed clamps. It is provided with endless worm feed, which beats any temper screw. Wear of steel cable over pulley is obviated. When drill feed out cable is worn out, it takes but a few feet to replace it instead of several hundred feet. Tools are run in and pulled out by steel cable. Any one with reasonable judgment can quickly master the operation of this outfit and the business of drilling wells. Derrick folds down upon the machine for moving, and is raised and lowered by engine.

These outfits are made in modified form with pumps for soft material jetting work, for which see an adjacent page.

We furnish tongue, whiffletrees and neckyoke. Dynamo electric sparker is put on at small advance. Manila drilling cable instead of steel may be used.

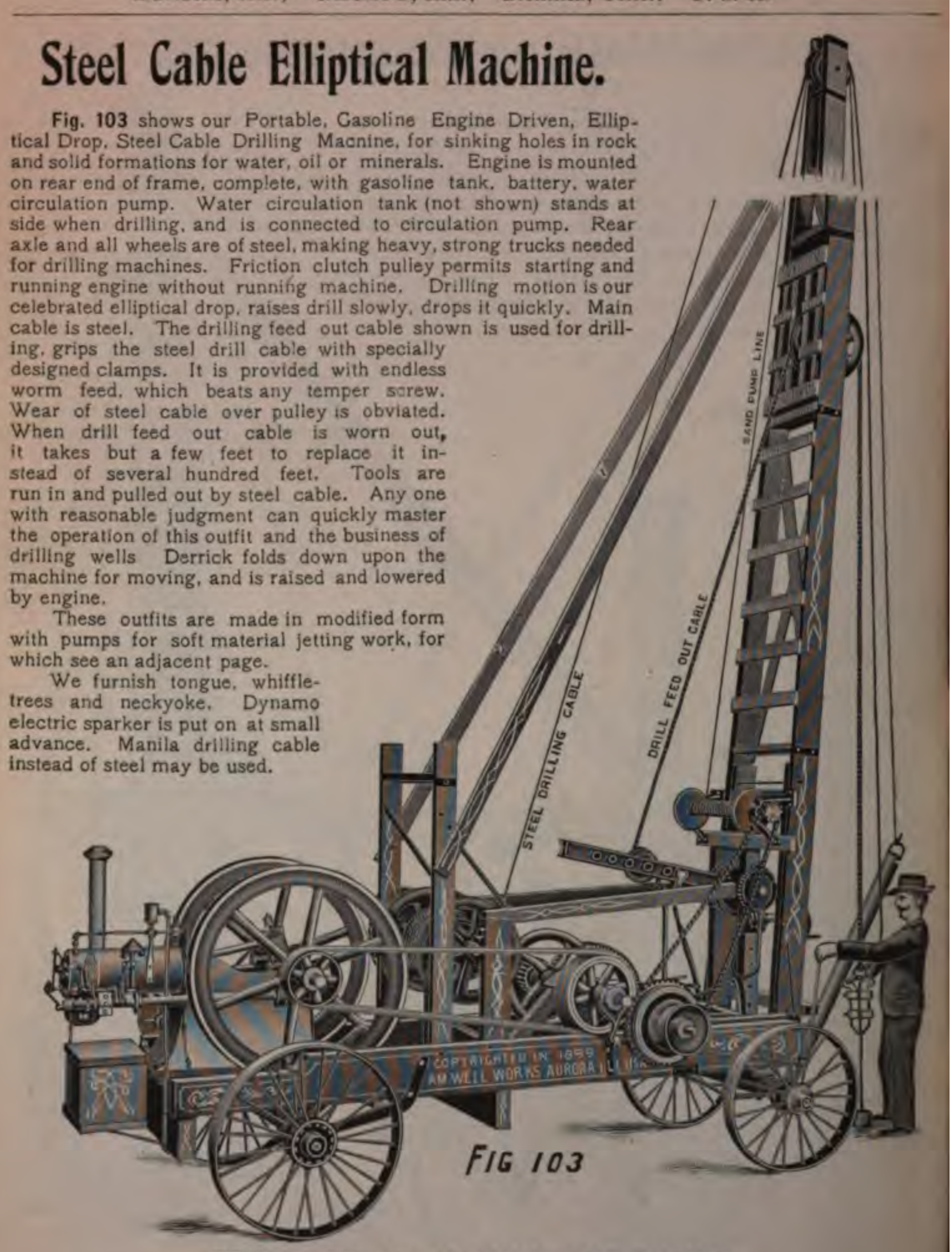


FIG 103

PRICES, FIG. 103 MACHINE AND ENGINE.

Steel Cable, Sand Line, Cat Head and Pump not included. For Tools, see "Rock Tool List" on an adjacent page.

No.	Depth* Drills.	H. P. of Engine.	Range Drills used.†	Use Tools, Wt. of, Lbs.	Use Steel Cable, In.	Code.	Price without Tools.	Add if friction instead of clutch on drawworks.
1	300	5	4 to 6	500 to 850	½	Rabad	$ 830.	$20.
2	500	6	4 " 8	600 " 1100	½	Race	1000.	25.
3	750	8	4 " 8	800 " 1400	½	Radg	1330.	30.
4	1000	12	5 " 10	1000 " 1600	⅝	Raffo	1630.	40.

Refers to cable will handle, and depth will sink with medium tools.* For 750 to 1000 ft. work build derrick. *†Larger drills mentioned are used on* **short cable shallow work, and in starting deep holes.

Steel Cable Elliptical Drilling Machine.

Fig. 20 illustrates our Portable Steam Steel Cable Elliptical Drop k Drilling Machine used for sinking wells or prospecting through l rock and all formations suitable for a cable outfit. For soft form- ns requiring Chapman's Patent Jetting or rotary processes, add ing or Rotary Attachments, or both, making a combined outfit ble of doing any work encountered in general drilling. machine is well built. Boiler has submerged flues, pre- ing burning flues by quick firing, boiler feed pump or tor as prefered. The driller has control of entire hine within reach. The elliptical gears raise drill slowly power, and drop it quickly with free blow, doing more k than any walking beam drill. Cut shows tools just y to run in after sand pumping. When run in, the clamps rill feed out cable are clamped to wire drilling cable, drilling is done by feed out cable over lower sheave el, preventing all wear of steel cable over sheaves. A m gear gives perfect control of feed-out. Manila cable be used instead of l if preferred, at same e. Fig. 20 is also fur- ed with gasoline engine ad of boiler and engine n preferred.

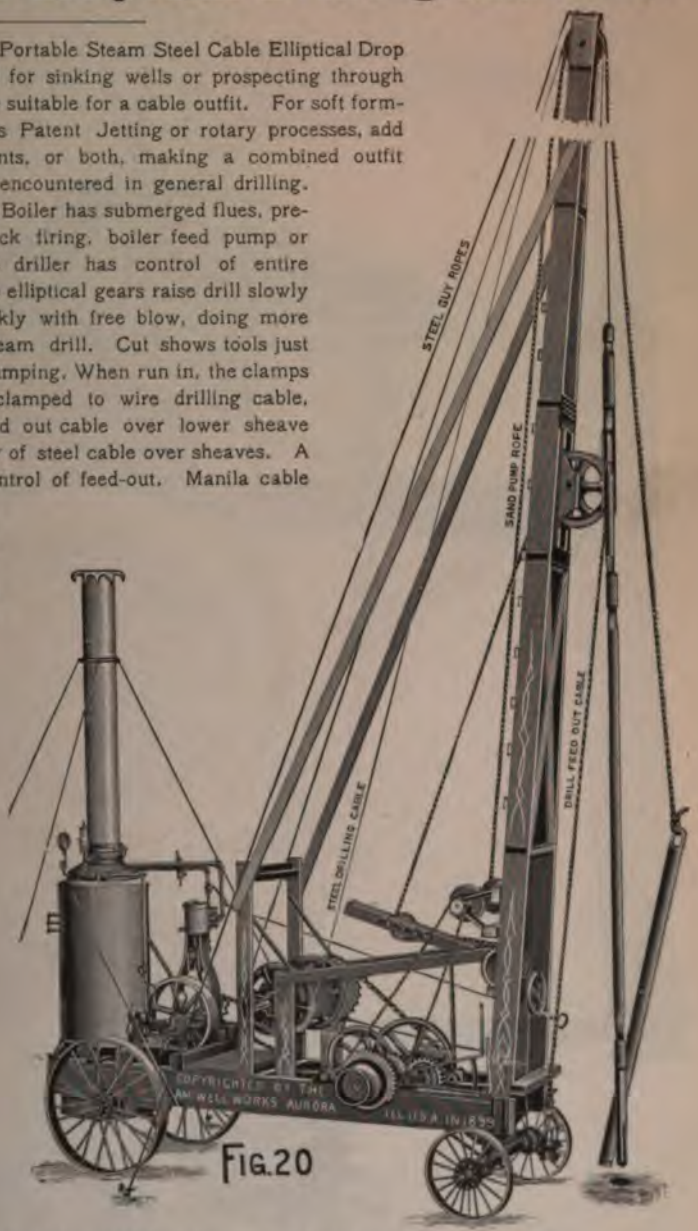


FIG. 20

PRICES FIG. 20, STEEL CABLE DRILLING MACHINE.

de machine complete, tongue, whiffletrees, neckyoke, firing tools, drill feed out cable, sheave, and cable clamps y. For Full Outfit add "Rock Tool" list and prices on an adjacent page using steel or Manila cable, as preferred.

o.	Depth Drills.	H. P. Boiler.	Diam. Steel Cable In.	Code.	Prices Without Tools.
1	300	6	½	Rag	$ 785.
2	500	8	½	Reg	900.
3	750	10	⅝	Rog	1160.
4	1000	12	⅝	Rug	1400.

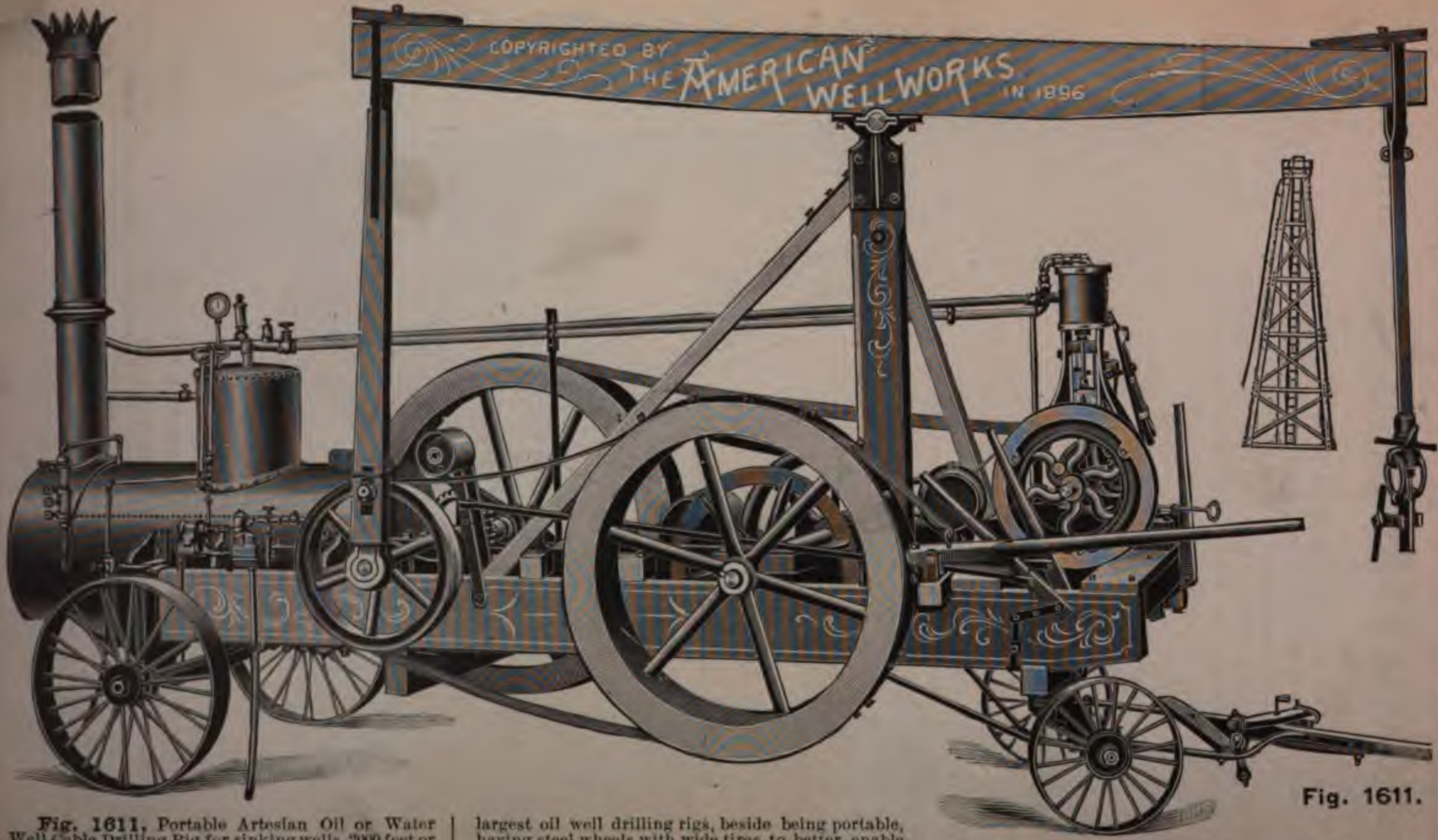


Fig. 1611.

Fig. 1611. Portable Artesian Oil or Water Well Cable Drilling Rig for sinking wells, 2000 feet or less, by jumping the drill with a rope connected to a string of drilling tools: viz., drill, auger stem, jars, sinker. It is suitable for drilling wells where hard rock is encountered, and where a dry well can be put down. This rig possesses all the advantages of the largest oil well drilling rigs, beside being portable, having steel wheels with wide tires to better enable it to travel over soft roads. It is one of our latest improved established standard rigs. The driller can manipulate any part of the machine with one hand while he turns the drill with the other. It is an excellent machine of our highest standard and has won for us large patronage. All its shafts are steel. The crank of the engine is the same diameter as the shaft.

Price for **Fig. 706** in the following page of encyclopedia, is price list for this rig also. The same list of tools also applies.

. **1611** and **706** on the preceding pages are fitted with our elliptic gearing for spudding of tools down below the surface.

driving elliptic gear is on the main shaft, the driven elliptic gear on an auxiliary ie driven elliptic gear has a crank pin on which runs a sheave wheel, over which the cable m drum. The rotation of the driven gear raises the drill slowly and drops it quickly with

is the best spudding arrangement made, and in fact, faster drilling can be done with it than lking beam.

iange from spudding to pulling out, throw cable off from sheave—nothing more.

machines are stronger and heavier than any other make of similar styled outfits, and will i deeper than rated if handled carefully.

riving pipe, use Fig. 1076, clamp on drill bar, and Fig. 1031 hollow drive head on pipe, the irnishes the weight and extends down inside the pipe being driven.

List of Tools with Figs. 1611 and 706—Ropes Extra.

ig Clamp (1076).
v Drive Head (1081).
er Screw.
Socket (1213).
[illegible]
uy Rope Stakes.
Filling Funnel.
l.
oe.

1 Poker.
1 Flue Cleaner.
1 12 lb. Sledge.
1 Blower.
1 Blower Hose (10 feet).
1 Tuyere Iron.
1 Anvil.
1 Smithing Hammer.
2 Smithing Tongs.
1 Cold Chisel.
2 Pr. Chain Pipe Tongs (1376).
1 Pr. Pipe Tongs (80).
1 14" Pipe Wrench.
1 15" Monkey Wrench.
1 Hatchet.
1 Saw.
1 Brace.
3 Bitts.
1 Oil Can.
1 Oiler.
1 File.
1 Tool Box and Lock.

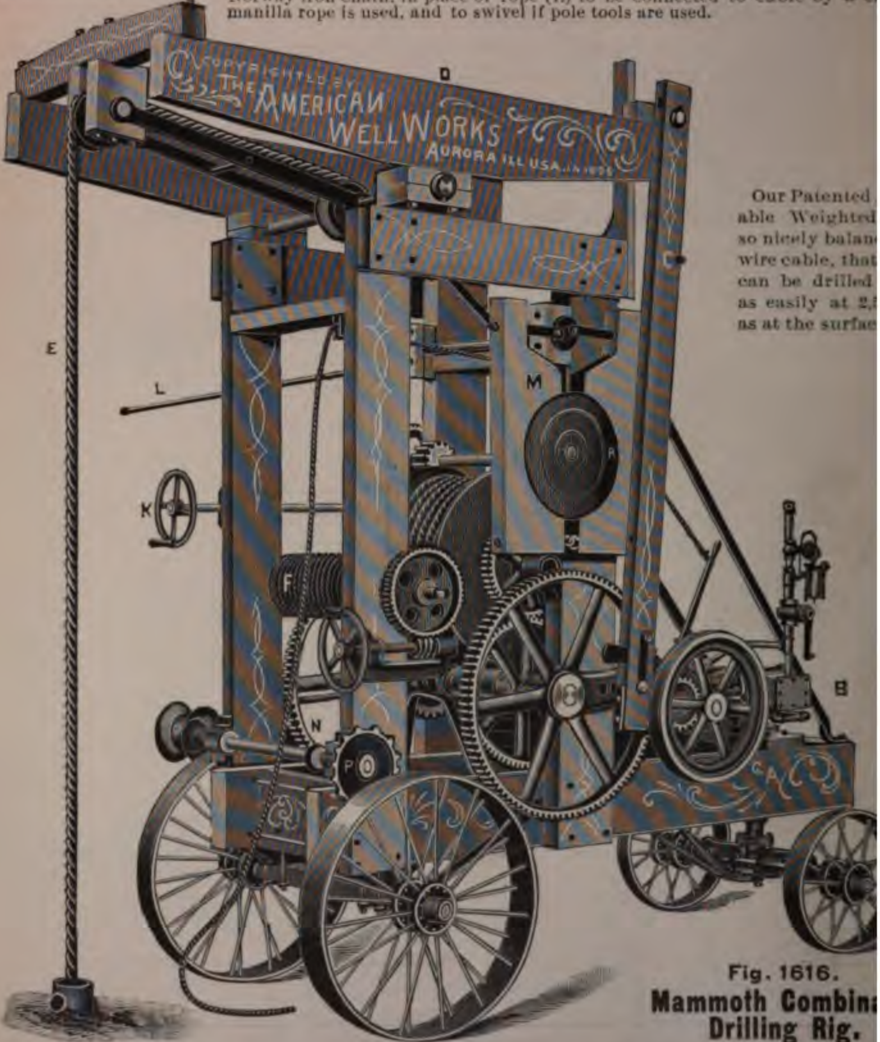
umber of Machine.	1	2	3	4	5	6	7
ls in feet	300	500	750	1000	1250	1500	2000
er Cable, of Diameter	1¼	1½	1½	1¾	1¾	1¾	1⅞
Pump Line " "	⅝	⅝	⅝	¾	¾	¾	⅞
ate Weight of Machine	5000	5500	6000	7000	8500	9500	11000
ate Weight of Tools	2000	2500	3000	3200	3500	3800	4200
g. **1611** Machine with list of Tools	$1200	$1400	$1500	$1600	$1800	$1900	$2000

ng Cable and Sand Line extra at market price. We use pure Manila cable.

Fig. 1616 is made from a photograph of one of our **Drilling Rigs** for using Wire or Manilla Rope
Poles or Iron Pipe for connecting the machine with the drill. For sinking wells for oil,-water or gas
making test holes for prospecting for minerals, by any of the methods for sinking, when rotary tools a
able harmonious machinery are added.

When sinking by jumping the drill, the walking beam is operated by two cranked gears. One side
tion is shown int his picture; they are disconnected when not in use. The rope on the large drum is f
ing and hoisting the pipe when sinking the well by the revolving process. Safety Clutch (R) is gripped
vent backing or dropping of load by accident, by the clamp (M) and lever (L) and lowers the load by frict
drum cannot unwind until the lever (L) is released. The engines are double, more clearly shown by Fig. 16
reversing link controlled by loose rope at well, enables the load to be hoisted or lowered slowly or rapidly
derricks Figs. 354, 787, and 1162 for mode of supporting, lowering and hoisting. For Rotary Machines, s
1227, 1228 and 1229, and for methods of rotating, see Rotary Department. The axles and wheels are steel.

Adamantine is successfully used with our rotary machinery for taking core, or for borings as may be r
This machine can be adapted for drilling with wire rope, as one end of rope is connected to drum, and t
to the drill, is fed out by worm gearing. When for drilling with cable or pole tools we will furnish a
Norway iron chain, in place of rope (E) to be connected to cable by a c
manilla rope is used, and to swivel if pole tools are used.



Our Patented
able Weighted
so nicely balan
wire cable, that
can be drilled
as easily at 2,
as at the surfac

Fig. 1616.
Mammoth Combin
Drilling Rig.

**PRICES FOR FIG. 1616 INCLUDE THE RIG AS SHOWN WITH TWO ENGINES CONNECTED AT R
ANGLES, HAVING REVERSIBLE LINK MOTION, WAGON, TONGUE, AND WIFFLETREES.**

Ropes, Drilling Tools, Boiler and Rotary Tools are not included in these prices.

Depth of Well it will sink in ft	2000	2000	2500	2
Size Bore of Well will sink, In.	8 and less.	10 and less.	12 and less.	15 an
Diam. of each Cyl. of Double Engine furnished, In.	7	8	9	1
Length of Stroke, In.	9	12	12	1
[illegible]umber of Horse Power of Engine	20	30	40	[illegible]
[illegible] for **Fig. 1616**	$2000.00	$2300.00	$3000.00	$250

Standard Cable Drilling Rigs.

Figs. 1075–1296 illustrate our Standard Cable Drilling Rigs for drilling deep holes in rock, for ter. oil or gas.

We list machines and derrick separately, as drillers usually prefer to build derrick on ground, ing transportation. We list bolted derrick also so purchaser may secure it if desired. We list Set Irons, which may be purchased and taken to out of the way places where lumber is abundant, lding machine on the ground.

PRICES AND LIST OF STANDARD DRILLING MACHINE ONLY, consisting of:—

1 Machine complete.
1 Unmounted Locomotive Boiler.
1 Reversible Engine on Block,
Eng. Connecting Piping.
1 Main Belt.
1 Telegraph Line.
1 Reversing Cord.
1 Bull Rope.
1 Set Bull Wheels.
1 Brake and Lever.
1 Crown Pulley.
1 Sand Pump Pulley.

Price, Medium (Boiler 20 and Engine 15 H. P.)	(Reddex)	**$1575.00**
" **Heavy,** (" 25 " " 20 ")	(Reec)	**1790.00**

Add to make complete rig, a complete Set of Drilling Tools (appears on next page) prices of which will be found on other pages in catalogue. Drilling cable and sand line of length and size desired, will be furnished at market price.

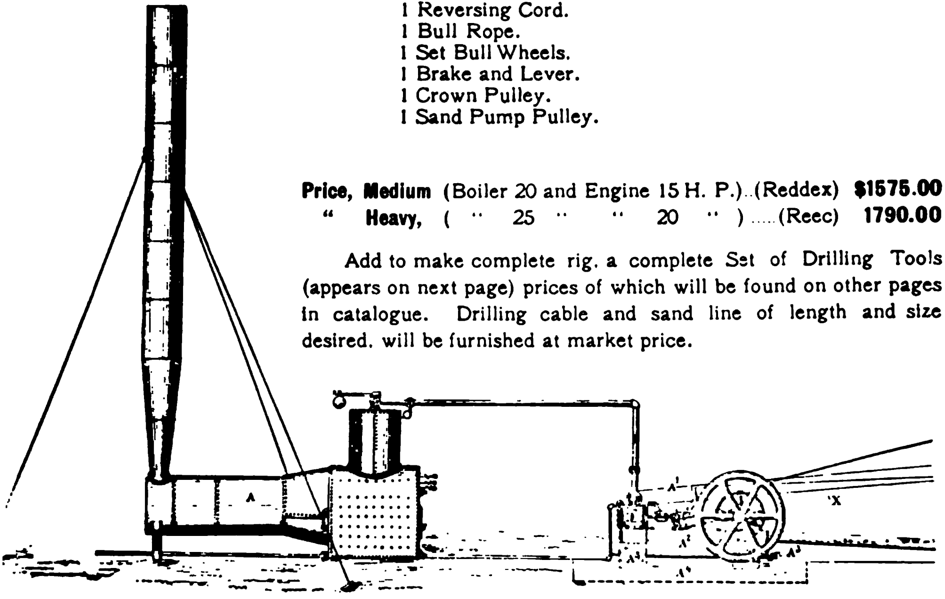


Fig. 1296.

PRICE OF BOLTED DERRICK ONLY.

Ft. **Bolted Derrick**, framework and bolts only, complete	(Reggex)	**$375.00**
Ft. " " " " " " "	(Rehi)	**430.00**

SET RIG IRONS, consisting of:—

1 Walking Beam Saddle.
1 Stirrup.
2 Gudgeons and Ban s.
1 Shaft with Mountings complete.
1 Crown Pulley.
1 Sand Pump Pulley.
1 Drilling Hook.

Set Rig Irons, Medium,	(Reil)	**$70.00**
" " " " **Heavy,**	(Reep)	**90.00**

Oil or Artesian W
Driller's Outfit.

Less Engine.

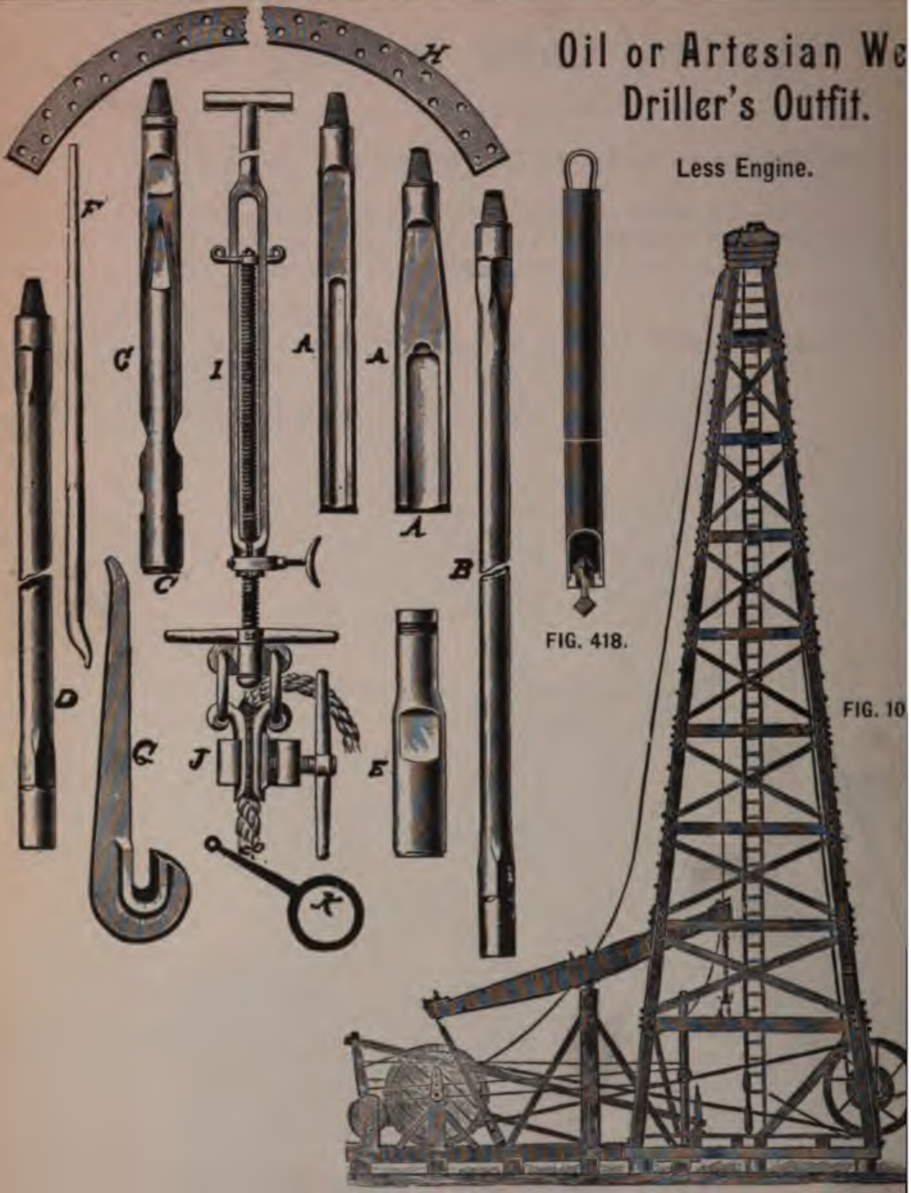


FIG. 418.

FIG. 10

The plate of tools marked A, B, C, D, E, F, G, H, I, J, K, s what is known as a Drilling Tools.

A complete set of drill tools are known as follows:

2 8-in. Drill Bits, (A).
2 5⅝-in. Drill Bits, (A).
1 Auger Stem, (B).
1 Set of Jars, (C).
1 Sinker Bar, (D).

1 Rope Socket,
1 Temper Screw (I).
2 Tool Gauges for 5⅝-in. and 8-in. (K).
2 Tool Wrenches, (G).

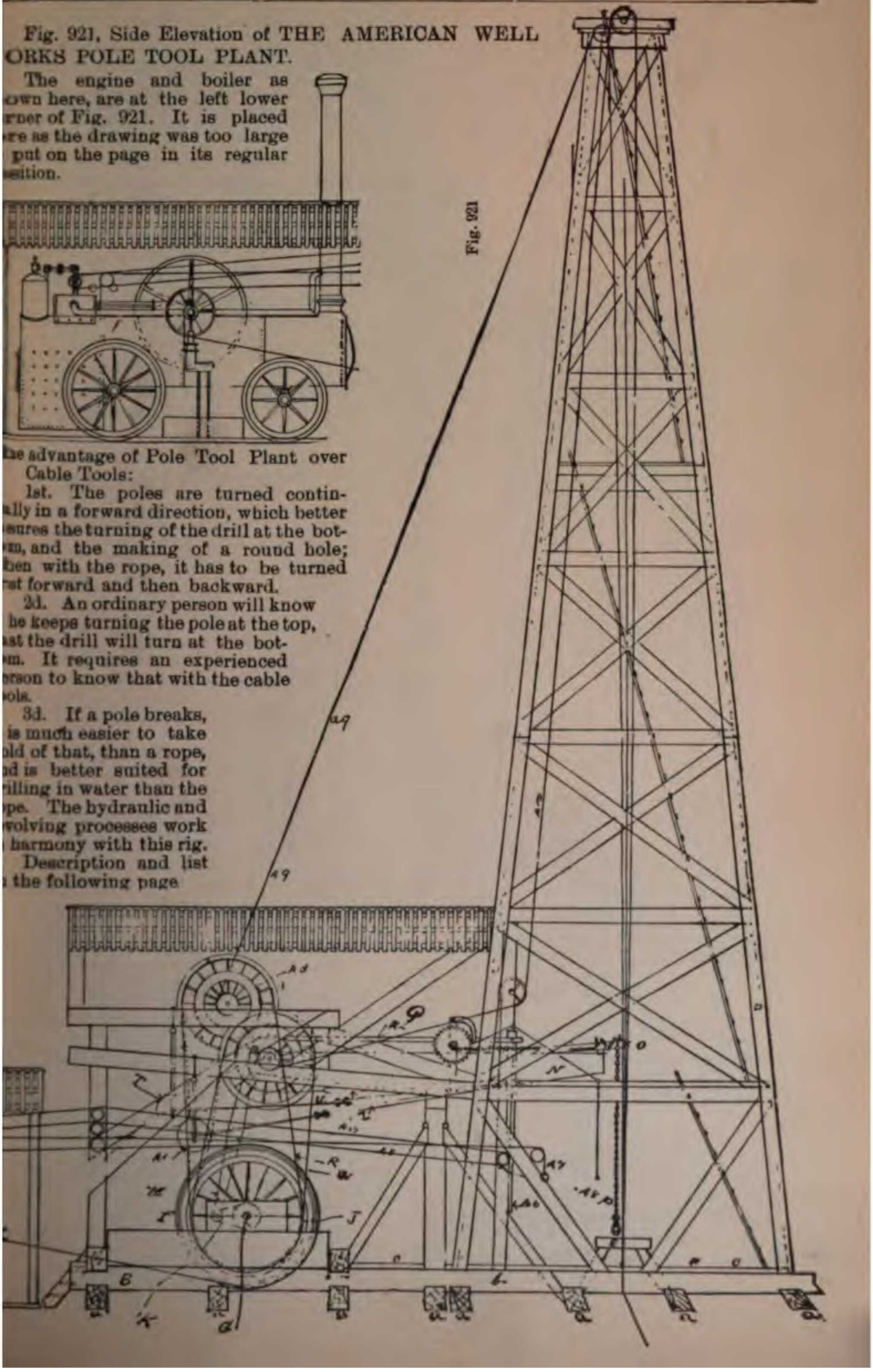
1 Wrench Circle, (H).
1 Wrench Bar, (F).
1 Wrench Hook, (not show
1 Mud Socket, Fig. 671.
1 Sand Pump, Fig. 418.

When the rock is near the surface, the drill is started by spudding, that is, a rope is connected to th
o the rope which holds the tools, and they are fed out by loosening the brake band on the bull wheel
ls are sufficiently deep, a temper screw, I, J., or Fig. 1222 is connected to the rope and walking bea
ig. 1075 is an ordinary oil and gas well derrick.

ee other pages for prices of tools.)

Fig. 921, Side Elevation of THE AMERICAN WELL
ORKS POLE TOOL PLANT.

The engine and boiler as
own here, are at the left lower
rner of Fig. 921. It is placed
re as the drawing was too large
put on the page in its regular
sition.



he advantage of Pole Tool Plant over
Cable Tools:

1st. The poles are turned contin-
ally in a forward direction, which better
sures the turning of the drill at the bot-
m, and the making of a round hole;
hen with the rope, it has to be turned
st forward and then backward.

2d. An ordinary person will know
he keeps turning the pole at the top,
at the drill will turn at the bot-
m. It requires an experienced
rson to know that with the cable
ols.

3d. If a pole breaks,
is much easier to take
old of that, than a rope,
d is better suited for
illing in water than the
pe. The hydraulic and
volving processes work
harmony with this rig.

Description and list
the following page

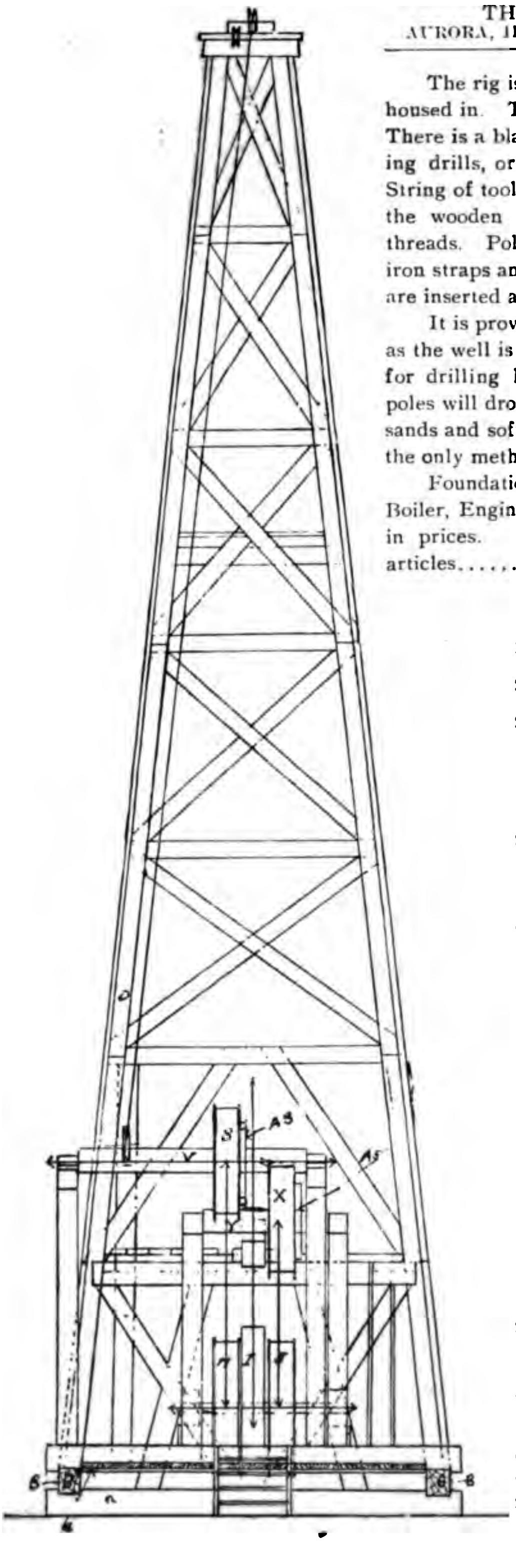


Fig. 922.

The rig is set up as shown by **Figs. 921 and 922**, housed in. The work can be continued night and d There is a blacksmith forge set in the derrick for sharp ing drills, or doing any repairs that may be necessa String of tools consists of Drill, Auger Stem, the Jars, the wooden poles to connect to jars by tapering sc threads. Poles 16 ft. long are joined together by Nor iron straps and rivets, having a coupling on each end; t are inserted and taken out in lengths of 36 ft.

It is provided with a Worm Feed for lowering the t as the well is deepened. These tools are especially adap for drilling hard rock, having water bearing strata, poles will drop free in water, rope will not. When qu sands and soft formations are met, the revolving proces the only method that will penetrate them.

Foundation Timbers, Mud Sills, Roofing Boa Boiler, Engine, and Engine Driving Belt, are not inclu in prices. Price for rig complete, less above na articles..$55

Price List of Pole Tools.

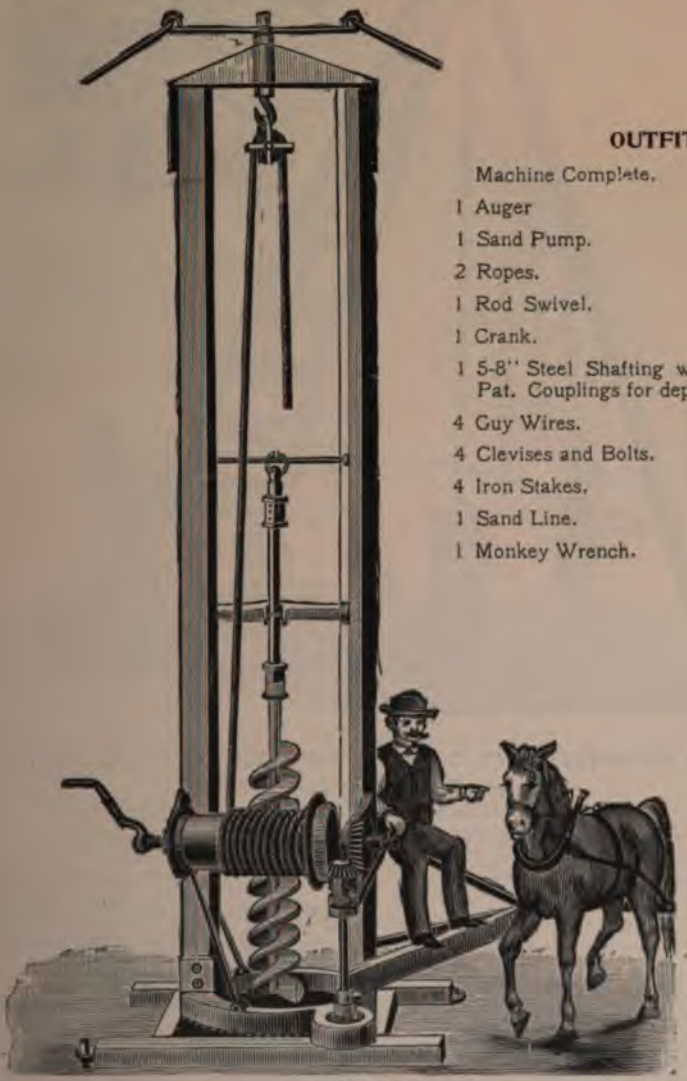
1 8-in. Fluted Club Bit, Fig. 605 (for standard drive pipe or casing sizes when required..	$
2 6-in. Fluted Club Bit, Fig. 605 (for standard drive pipe or casing sizes when required)..	
2 4½-in. Fluted Club Bit, Fig. 605 (for standard drive pipe or casing sizes when required)..	
1 each, 8, 6, and 4½-in. Expansion Under Reamer..	1
1 3½ x 28-ft. Drill Bar.........................	
1 2½-in. x 16-ft. Sinker Bar for Pole Joint. .	
2 Pair Piston Jars..............................	1
1 3½-in. (Outside) Sand Pump, 31 ft. long, pin coupling on top, inside center coupling with Steel Shoe on bottom, to work inside 4½-in. pipe......................	
2 Tool Wrenches with claws..................	
1 Lever and Chain Tightener................	
3 Pole Wrenches (steel).......	
1 Hand Swivel.....	
1 Drilling Swivel...........	
1 Drilling Chain	
1 Cable Weight with Swivel	
120 ft. ⅞-in. L. T. Wire Cable with Clevis leaded on	
1 Set Driving Clamps to attach to Drill Bar..	
1 each, 8-in., 6-in. and 4½-in. Hollow Steel Drive Head...	
1 Valve Fishing Tool with large bowl connected to 20 ft. 3-in. pipe with pole pin coupling on top, (Valve, 2 Bowls)..........	
1 Hook Grab for Poles.....	
1 Each, 8-in., 6-in. and 4½-in. Drill Gauges..	
1000 ft. 2-in. Poles, Straps and Couplings ..	
1 each, 5-ft. 10-ft. and 15-ft lengths Drill Poles with Taper Box and Pin Coupling...	
2 Steel Tool Wrenches for small hole........	
100 lb. Rivet Iron.	

WELL CASING TOOLS.

500 ft 1½-in. best Manilla Rope......	$
4 2-Sheave Twinned Pulley Blocks, for 1½ in. Rope (1 set with guides)...............	
2 C Hooks for top and bottom........	
2 Pair No. 5 Robbin Chain Tongs............	
2 each, 8-in., 6 in. and 4½-in. Malleable Casing Elevators..........................	
Prices are for complete list only.	$

Newman Well Auger Outfits.

Fig. 192 illustrates our patent Newman Well Auger Outfit for boring wells from 6 to 12 inches ameter in formations which an auger will cut and which will hold its bank. Guy wires hold the r frame in position and one man operates auger as shown.



OUTFIT LIST.

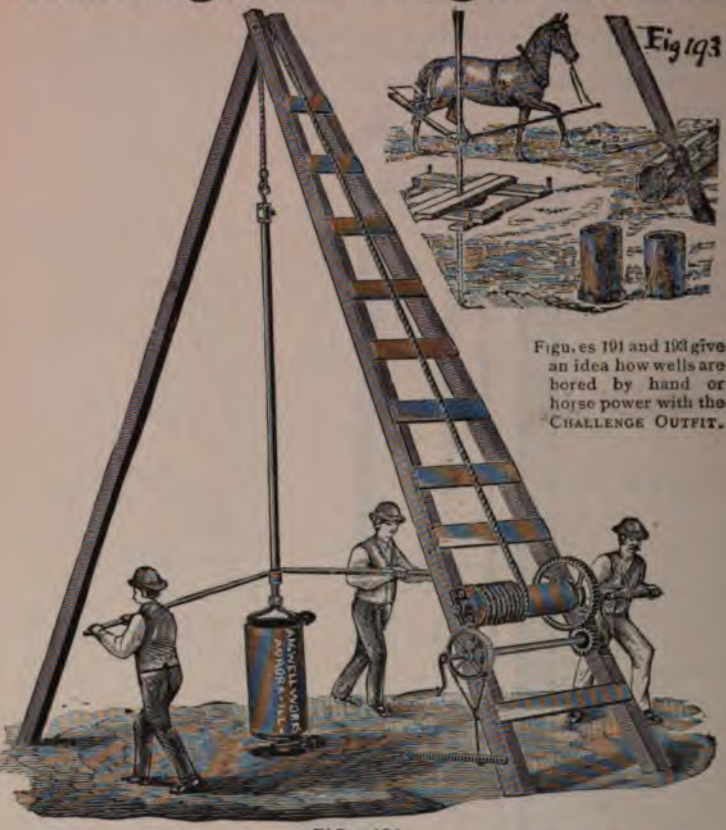
Machine Complete.
1 Auger
1 Sand Pump.
2 Ropes.
1 Rod Swivel.
1 Crank.
1 5-8'' Steel Shafting with Pat. Couplings for depth.
4 Guy Wires.
4 Clevises and Bolts.
4 Iron Stakes.
1 Sand Line.
1 Monkey Wrench.

FIG. 192.

The horse revolves main frame, which in turn revolves the auger, quickly filling it. When auger ll the clutch (the lever of which the man has hold) is thrown in and the horse draws the auger It is emptied and the process repeated. We also mount the auger on trucks, and you can commence ng a few minutes after arriving on the ground. Auger will fill a distance of 9 ft. were it that long. others if their augers will do that. The hole when bored may be cased with wood, tile, cement, alvanized iron tubing.

ce No. 79 Newman Auger Outfit complete for boring 100 feet.	$250
" **80** " " " " " " 200 "	300
for mounting outfits Nos. 79 or 80, add to list of each	75

Challenge Well Auger Outfits.



Figures 191 and 193 give an idea how wells are bored by hand or horse power with the CHALLENGE OUTFIT.

FIG. 191.

LIST CONSTITUTING CHALLENGE WELL AUGER OUTFITS FOR 60-FEET EARTH BORING.

If desired to bore deeper than 60 feet, get more shafting.

1 Auger with Reamer.
1 Drum Shaft and Gear.
1 Crank Shaft complete.
2 pr. Double Shaft Boxes.
2 Cranks (hand).
2 Boring Levers (hand).
1 Boring Lever (horse.)
60 ft. Shafting with Self Couplers.
45 ft. 1-in. Auger Rope.
75 ft. ⅝-in Sand Rope.
80 ft. Steel Guy Rope.
1 Swivel Hook.
1 Sand Pump.
1 Brake.
1 Derrick Sheave and Bolt.
1 Derrick Woodwork.
1 Sand Rope Sheave and Gua
8 Bolts (for boxes).

LIST PRICES FIG. 191 CHALLENGE AUGER OUTFITS.

Outfit No.	**71**	with	8 or 9	inch Auger,	1½	inch Shafting		**$140**
" "	**72**	"	11 or 12	" "	1¾	"	"	**150**
" "	**73**	"	15	" "	1¾	"	"	**155**
" "	**74**	"	18	" "	2	"	"	**170**
" "	**75**	"	20	" "	2	"	"	**175**

LIST PRICES OF CHALLENGE AUGER OUTFIT EXTRAS.

Derrick Gearing (Shafts, Boxes. Gears and Cranks)	$28 00
Swivel Hook	2 50
Gear Wheel	5 00
Pinion	2 00
Rope Sheave	1 90
Double Boxes, pair	3 50
Derrick Woodwork only	15 00
Boring Lever (Hand)	3 00

Boring Lever (Horse)	$ 6
1½ in. Square Shafting Coupled, per ft.	
1¾ " " " " " "	
2 " " " " " "	1
2-in. X Heavy Hollow Shafting Coupled 1½ or 1¾-in., per ft.	
2½-in. X Heavy Hollow Shafting Coupled 2-in., per ft.	1

Auger Fishing Tools, Coupling, Tile Setter

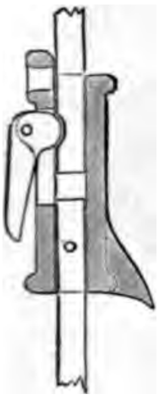


Fig. 190.

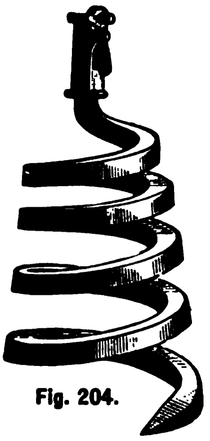


Fig. 204.

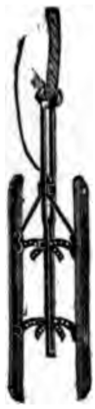


Fig. 189.

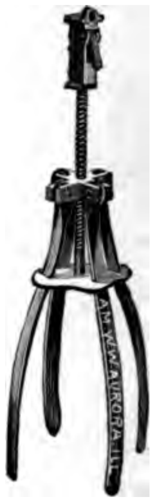

AM. W. W. AURORA, ILL.

Fig. 212.

Fig. 189, Tile Setter. used for lowering tile into well bored by an auger to case it. Tile is lowered to place and the setter is then released by the small cord shown in cut.

Fig. 190 is Self Fastening Coupling for Challenge Auger Shafting. Raising the catch shown releases a length of shafting.

Fig. 204, Ram's Horn. is used for removing stones from a hole being sunk by a Challenge Auger, which Auger will not take.

Fig. 212, Stone Grapple. catches anything lost in an auger hole. or removes stones by being lowered over them. After lowering. the shaft is turned. which causes the fingers to grapple the obstruction sufficiently to draw it up.

Fig. 189,	Tile Setter to handle 10 inch tile	**$16.00**
" **190,**	Challenge Coupling for 1½ inch square shafting	**2.00**
" **190,**	" " " 1¼ " " "	**2.50**
" **190,**	" " " 2 " " "	**3.50**
" **212,**	Stone Grapple for 12 inch hole or larger. 1¾ inch coupling	**25.00**
" **212,**	" " " 15 " " " " 2 " "	**38.00**
Newman Auger Coupling	for 1⅝ shafting	**2.00**

PRICES FIG. 204 RAM'S HORN.

Smallest hole used in, Inches	**8**	**10**	**12**	**15**
Made from stock "	1¼	1¼	1½	1½
Fig. 190 Coupling used	1½	1½	1¾	1¾
Fig. 204 Ram's Horn	**$11.00**	**$13.00**	**$17.00**	**$19.00**

Earth Boring Augers.

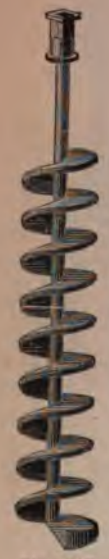


Fig. 217.

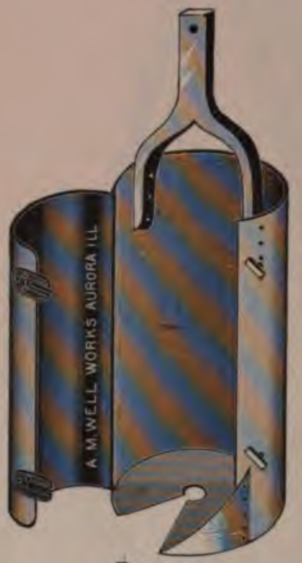


FIG 187

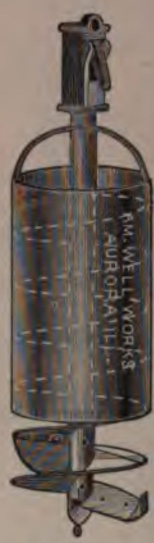


Fig. 218.

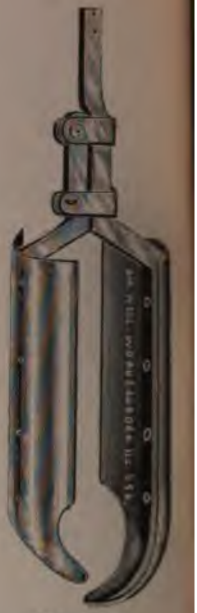


Fig. 1021.

Fig. 187. Challenge Auger is used with Fig. 191 outfits. It is made of steel. The cutting edge is of hard steel. When filled, auger is drawn up, door opened as shown, and emptied. A trap for retaining sand can be put in at additional cost if desired. A reamer for enlarging hole may be used. We make in larger sizes than listed but advise using regular sizes.

Fig. 217 Newman Auger is used with Fig. 192 outfits. It has a steel worm riveted to hydraulic shafting. The cutting edge is of hard steel. The coupling shown is riveted to auger shaft and takes size shafting listed.

Fig. 218 Cast Iron Cased Auger is used with Fig. 191 outfits. It has cast iron worm and steel cutting edge. Casing shown assists in holding the dirt.

Fig. 1021 American Hinged Auger is used with Fig. 191 outfits. It has no center, and is one of the best augers made for hard clays and ground infested with stones. When drawn up, drive out top pin, and auger opens discharging a load. A reamer for enlarging hole may be used.

PRICES AND SIZES OF AUGERS SHOWN.

Size hole will bore inches	**8**	**10**	**12**	**15**	**18**	**20**
Size square shafting for Figs. 187, 218 and 1021 only	1½	1½	1¾	1¾	2	2
Size square Shafting for Fig. 217, only	1⅝	1⅝	1⅝			
Price, Fig. 187	$23.	$27.	$30.	$35.	$40.	$45.
" " **217**	50.	60.	70.			
" " **218**	23.	31.	36.			
" " **1021**	40.	45.	50.	57.	65.	75.
" Reamer for Figs. 187, 217 and 1021 to enlarge hole one size	3.00	3.00	3.50	3.50	3.50	3.50

g. 342 is our Auger Turner Attachment. Can be used
ny of our drilling machines. A sprocket wheel will be
ied in place of a pulley when ordered.
ice..$50.00

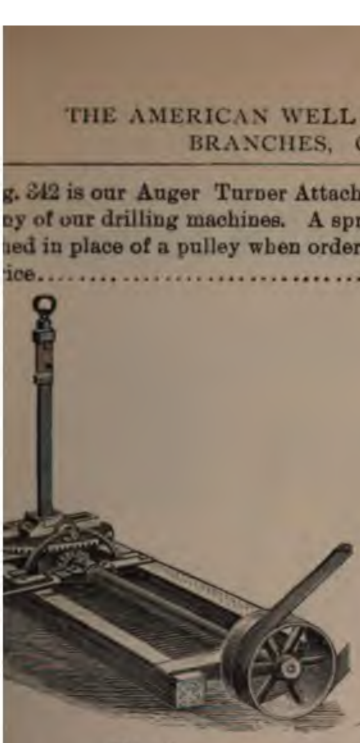


Fig. 342

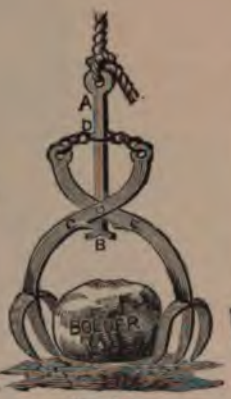


Fig. 364

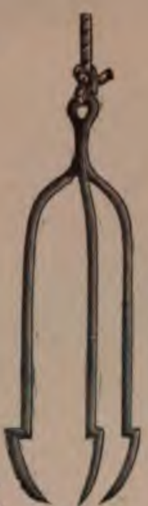


Fig. 365

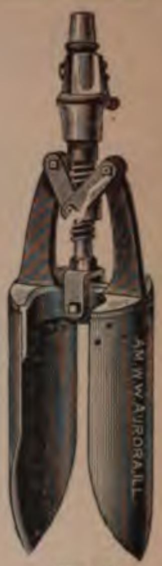

AM.W.W.AURORA.ILL.

Fig. 607

607 is a STONE EXCAVATOR and fishing tool used as a companion with the auger for removing ck and recovering any tool that may be dropped into the well. By turning the rod, it grips and holds le as in a vise.

SIZE IN INCHES.	4	6	12	16	24
Fig. 365 Tile Setter for placing tile in well..	$5.00	$8.00	$10.00	$12.00	$16.00
ig. 607 in inches.	3	4½	6	8	10
Fig. 607..................................	$12 00	$15.00	$18.00	$24.00	$30.00
nches of Fig. 364.........................	4	6	8	12	16
Fig. 364; it removes stones from bore of well	$6.00	$8.00	$12.00	$16.00	$20.00

. 1172 OUR HEAVY EARTH BOR-
IACHINE. *It has a fast and slow*
which can be changed by moving the
The weight of the machine forces the
down, should not its own weight be
nt.
is picture shows the machine
ut as it is heavy, it should be
d, and the small additional
ll justify the investment. We
rnish this with our *Elliptic*
g Motion as used and shown
s. 924 and 930. The horse
an be loaded on to the auger
machine when that is
d, by slid-
horse pow-
e sweeps.

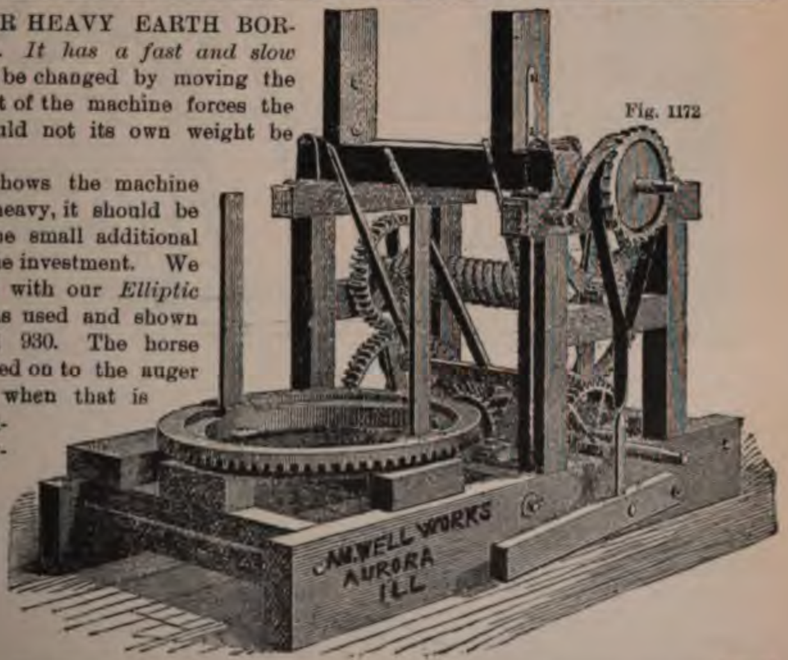


Fig. 1172

ring Machine, Fig. 1172, with derrick, not mounted........................$175.00
ring Machine, Fig. 1172, with derrick, mounted........................[illegible]
ring Machine, Fig. 1172, combined with our Elliptic drill, not mounted....................
ing Machine, *Fig.* 1172, and Elliptic Drop Combined, mounted......................

Mine Testing with Adamantine Boring Tools.

Fig. 1589, our Patent Prospectors' Friend, using Adamantine instead of diamonds, for taking a core from hard rock or minerals, and is suitable for mines, quarries, and general prospecting. With it, holes can be made at less than one-fourth the cost of diamond drilling. It is simple and easily manipulated. It can be operated by one or more men. A small stream of water is used to wash out the borings, which is supplied from the pump that is mounted on machine.

Fig. 1530 represents an imaginary section of rock being bored with Adamantine. The Adamantine is placed into the boring bit through our feeder. The water supply should be regulated to prevent the Adamantine being washed out by the use of too much water. As the bit is revolved, the particles of Adamantine engage with the bit, and are carried around with it, cutting the rock rapidly, leaving a clearance around the boring tool.

The Bit D has a bore for receiving the core; the arrow B shows the water and cuttings coming up. C shows the Adamantine.

We have used Adamantine with our Revolving Machinery for boring through hard strata of rock, then through clay, quicksand and gravel, and on reaching rock again the Adamantine has followed the bit down to the rock, and is there ready for use. The Adamantine is attracted to the magnetic bit and follows it. It is not worn out, and but very little lost.

The core can be taken out, or if left in the barrel it will wear away.

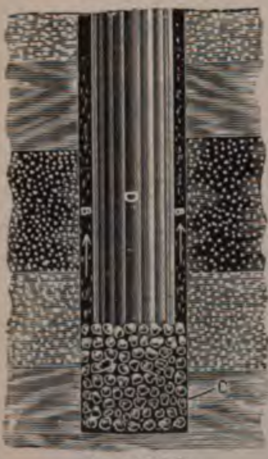


Fig 1530

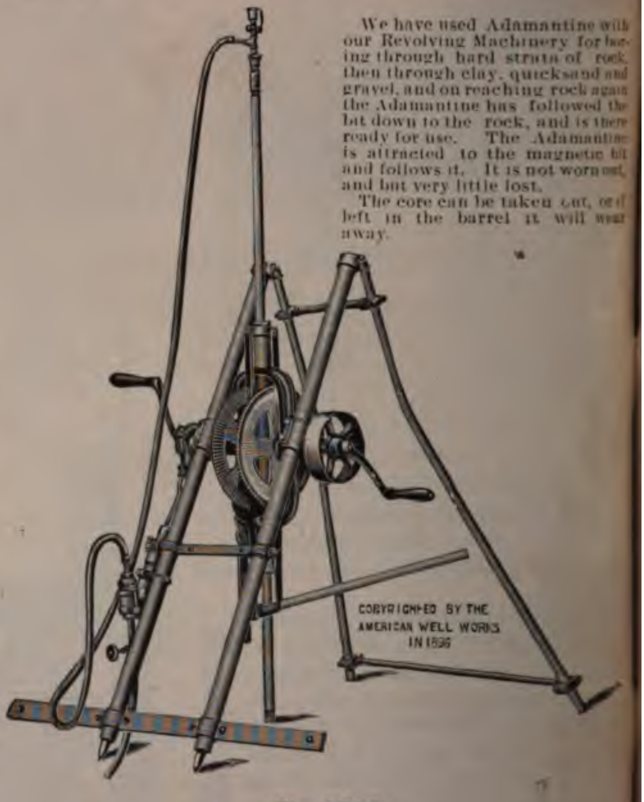


Fig. 1589.

The outfit may be operated by hand for light work; by horse or engine power for heavy work. One pound of Adamantine is sufficient to bore 10 feet in solid sand rock or limestone.

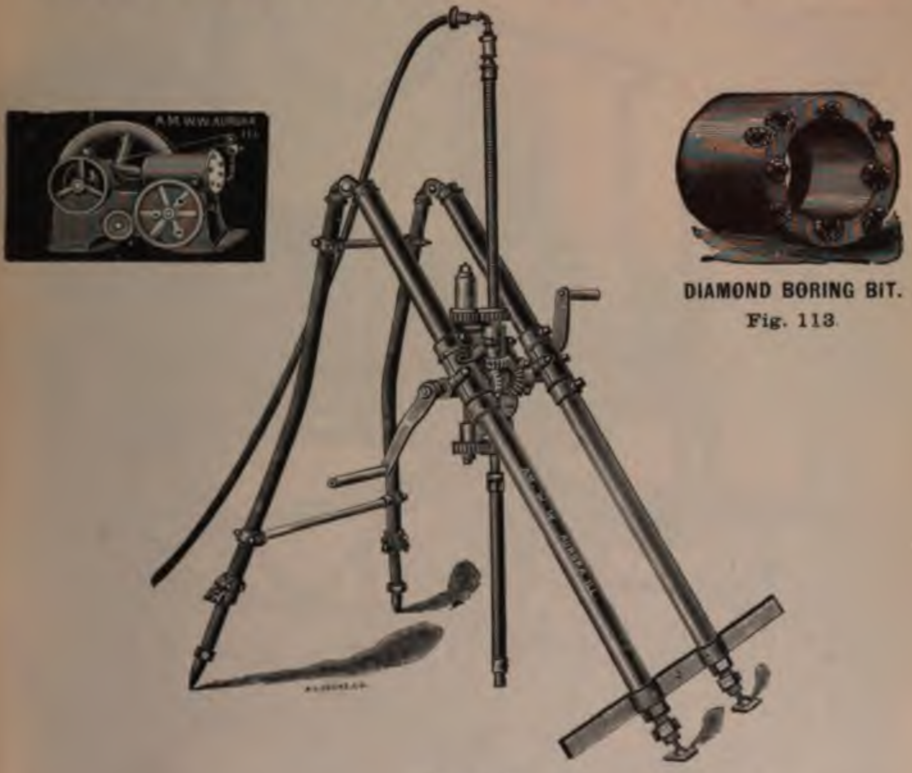
Fig. 1589 outfit consists of:—
1 Machine with Pulley, Handles and Pump.
5 ft. Suction Hose.
20 ft. Discharge Hose.
1 Adamantine Water Swivel.
1 Core Extractor.
Boring Rods for depth.
2 Adamantine Bits.
1 Hoisting Swivel.

Price complete for taking 1⅛ inch core to depth of 150 feet.............................$200
Price for Adamantine per lb... 5
Price for machines for boring any size or depth on application.

Adamantine can be used successfully with our Revolving Rigs by getting our Adamantine Boring which you can attach at a small expense.

Drilling tools left in the well, such as drills, iron or hard steel, can be recovered by the use of Adamantine, and Adamantine fishing tools, when it would be impossible to take them out of hard rock holes by other means. *State your conditions and get prices.*

PROSPECTOR'S DIAMOND DRILL.


A.M.W.W. AURORA ILL.

DIAMOND BORING BIT.
Fig. 113.

Fig. 736.

The Prospector Drill is especially manufactured to fill a long felt want of miners and prospectors for a reliable Diamond Core Drill to be operated by hand, horse, or power applied by belt.

There are two sets of feed gears, (a fast and slow motion); either can be engaged instantly, or they can both be thrown out of gear, thus quickly taking advantage of the hardness of the formations bored through. There is also a friction attachment to moderate the strain for boring in broken or uneven materials.

The drill is mounted on hinged legs, each having an adjustable foot rest to be adjusted to the uneven floor, by which it can be quickly set at any height or angle desired. Boards are placed across the straps, not shown, for the operator to stand on, and other weights can be loaded on to hold it down firmly. The drill carriage is slid on the frame when the rods are removed from the hole; the collars are left in place on the frame, so the resetting can be done instantly; by this adjustment the drill frame is never moved till the hole is complete.

For underground prospecting the hind legs are taken off and inserted into the top of front legs, and firmly set; the top is placed against the roof, and the bottom on the floor, the foot screws are set out and the machine is held firm. It can be set sidewise or ahead.

It bores holes 1⅝ inch in diameter to a depth of 400 feet, taking out a core 1⅛ in. in diameter.

We furnish the following list of Tools with this Machine, for the price named:

1 Bit, Set with Carbon.
2 Blank Bits ready to set.
1 Full Set Chisels—12 Tools—and Block for setting head.
100 Ft. Drill Rods and Improved Couplings.
1 Lever Force Pump.
1 6-Ft. Core Barrel.
1 20-inch Core Barrel.
1 Core Lifter.
1 Core Shell.
12 Ft. 1-inch 4-ply Suction Hose.
10 Ft. one-half inch 2-ply Water Hose.
1 Water Swivel and Hoisting Plug.
1 Lifting Swivel.
1 Pair Lift Tongs.
1 Pair Slide Tongs.
3 Pair of Pipe Tongs.
2 -inch Monkey Wrench.
2 Alligator Wrenches.
1 Spanner.
1 Head Wrench.
1 12-inch Pulley for hoisting Tools.
1 Copper Strainer for Suction Hose.
1 Tool Box with lock and key.
1 Gallon Oil Can.
1 Small Oiler.
½ lb. Copper Wire.

This Machine is made in first-class shape and is warranted, weight 582 pounds; Price $600.00.

Fig 765 illustrates our DIAMOND BORING BELT POWER MACHINE. It is designed to be used for boring holes where power can be applied from a belt or horse power. It is constructed to bore at any angle. We will mount this Machine on trucks with strong steel I Beam Frames, or if desired, only on platform. It is suitable for testing coal lands. It will bore a 2 inch hole and take out a 1 3-16 inch core. A person can use this Machine and test his land when he has leisure time. Two horses can bore 200 feet; four horses 500 feet. This is strong enough to bore 1,000 feet.

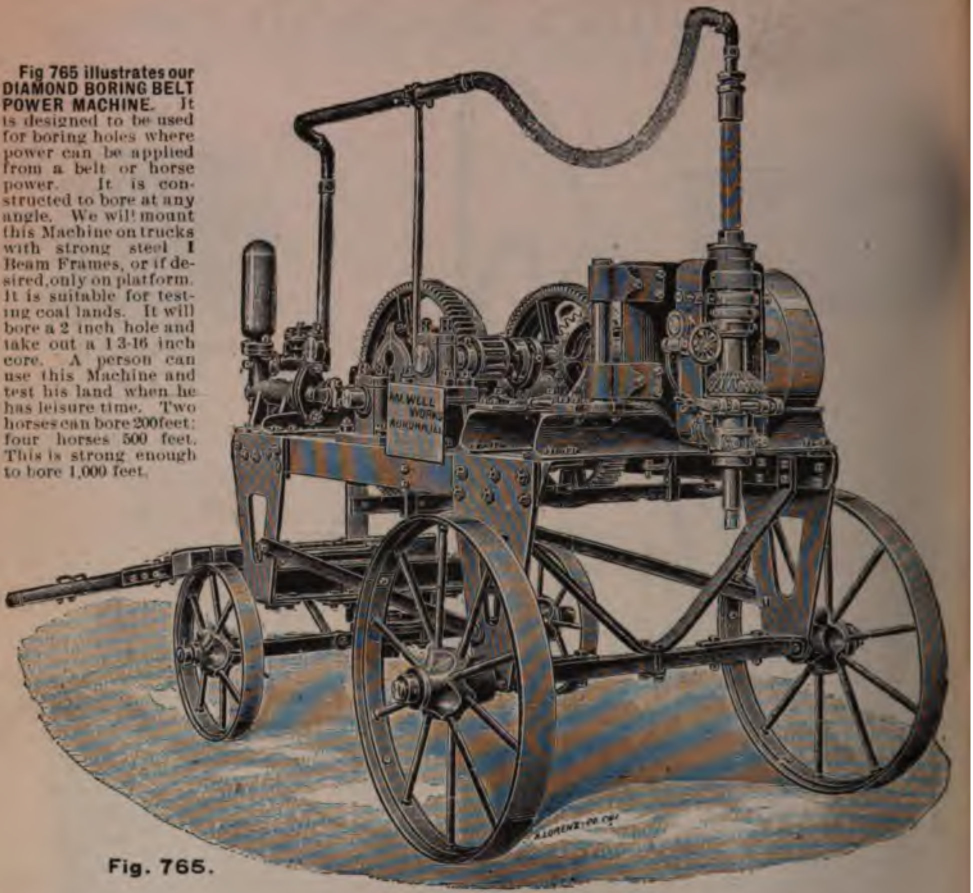

AM. WELL WORKS AURORA, ILL.

Fig. 765.

1 Bit set with carbons (black diamonds.)
2 Blank Bits, ready to set.
Full set of chisels (twelve tools) and a block for setting heads.
200 feet of Drill Rods with improved couplings.
1 half-length Drill Rod with coupling.
1 Core Barrel.
1 Core Lifter (consisting of shell and lifter.)
50 ft. 4-ply Water Hose, with connection.
20 ft. 4-ply Suction Hose with connections and strainer.
12 ft. 4-ply Water Hose to connect drill rod.
1 2-inch Steam Exhaust Pipe.
Swivel Steam Connection for engine.
1 Brass Water Swivel. Fig 480.
Wire rope (wound on hoisting drum) with hook; 75 feet ½ inch rope.
1 Rotary Cutter.
1 Safety Clamp. Fig. 485.
Hoisting Pulley.
Hoisting Bale and Bolt.
Lifting Swivel. Fig. 481.
1 Pressure Guage.
4 Steam Globe Valves.
1 Tool Chest with lock and key.
2 pairs Pipe Tongs, adjustable 1 inch to 2 inch.
1 14-inch Pipe Wrench.
1 12-inch Monkey Wrench.
1 Head Wrench.
1 Open End Wrench for stuffing boxes.
1 Open End Wrench for chuck and frame.
1 Open End Wrench for swivel.
1 Malleable Oiler.
1 One-gallon Oil Can.
1 Leather Packing Mould.
1 Steel Pin for packing box.

Mounted Outfit No. 229, with above List of Tools, and Fig. 765, for boring a 2-inch hole and taking out a 1 3-16 inch core, $1,500.

Outfit No. 230 includes Fig. 765, without wagon, built on a wood frame and the above List of Tools, $1,350.

Additional Rods with Couplings, $1.10 per foot. Add $100.00 for fitting this Machine and Tools to bore 2⅜ inch hole.

Diamond Boring Tools.

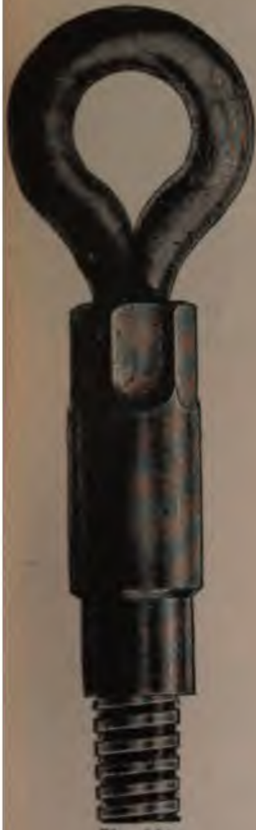


Fig. 481.

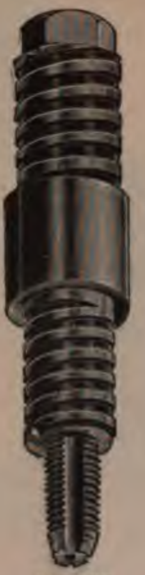


Fig. 568.

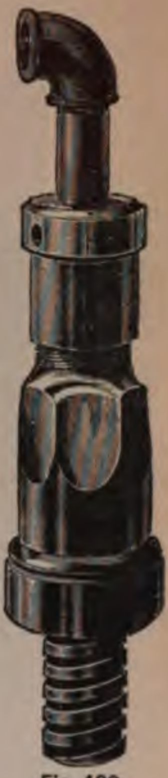


Fig. 480.

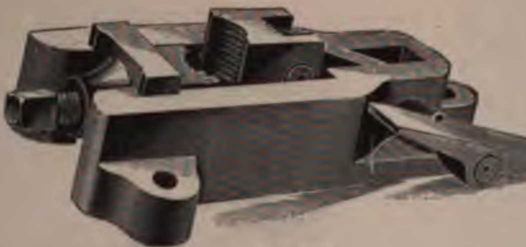


Fig. 485.

Fig. 480. Diamond Water Swivel, attaches to rods above machine with hose attachment at top nd for conducting water down the rods, permitting rods to turn.

Fig. 481. Diamond Rod Lifting Swivel, for taking out and putting rods in well.

Fig. 485. Safety Clamp, which grips diamond rods at any point desired, and is used in taking out nd putting rods into hole. The clamp also prevents rods turning when unscrewing or screwing them p so that tongs are not required for this purpose.

Fig. 568. Diamond Rod Recovering Tap for taking broken Diamond Rods out of well in case of ccident. It screws to the boring rod, and is let down, and screwed into the broken off part. There re three forms of this tap, and for the other two, see Figs. 764 and 1624 on another page which are made for diamond rods when so ordered.

PRICES, DIAMOND DRILLING SUPPLIES.

Fig. 481. Diamond Rod Lifting Swivel. 1¼ inch rods	$ 6.00
" 480. " " Boring " 1¼ " "	11.00
" 485, Safety Clamps, holds rods, Clamps 1¼ and 1½ inch	20.00

Diamond Boring Tools.

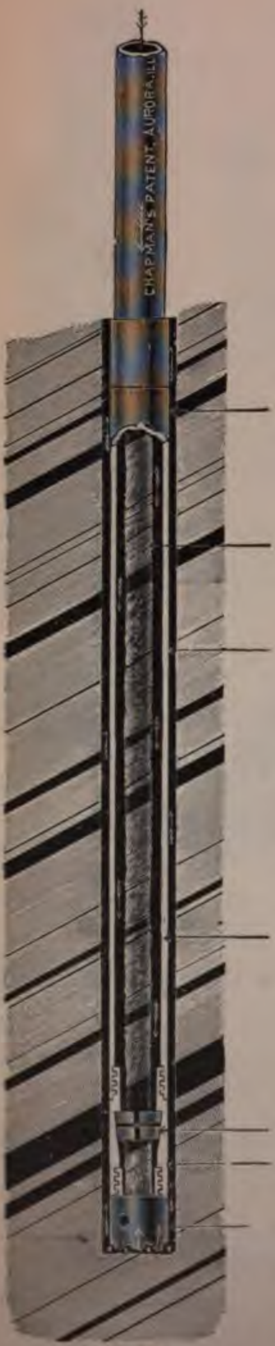


Fig. 583.

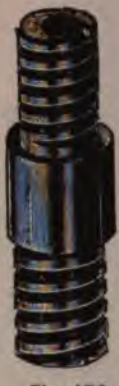


Fig. 478.

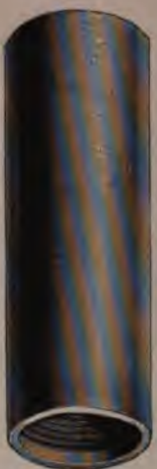


Fig. 484.

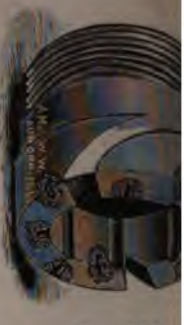


Fig. 585.

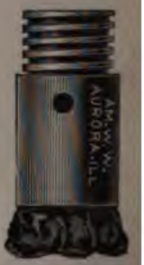

AM. W. W. AURORA, ILL.

Fig. 588.

Fig. 478. Diamond Boring Rod Coupling, by which the dri
are coupled, making flush joint.

Fig. 484. Core Shell, which holds the core lifter and come
above the drill as shown in Fig. 583.

Fig. 583. Drilling Section, shows drill at work, arrows indi
water current. It shows in turn, diamond drill, core shell, core
core barrel, drill rods.

Fig. 585, Diamond Drill Blank, set with diamonds.

Fig. 588, Diamond Extractor, is for recovering diamonds
hole while drilling. Tool is run into hole and pressed over dia
in the groove which are firmly held to bring them up.

PRICE DIAMOND DRILLING SUPPLIES.

Boring Rods Coupled with Fig. 478 Couplings,	1¼	inch,	per Ft.,
" **Rod** Couplings, Fig. 478,	1¼	"	each
Core Barrel shown in Fig. 583,	1¼	"	"
" **Shell** " " " " and by Fig. 484	1¼	"	"
" Lifter " " " "	1¼	"	"
Diamond Bit Blank only, Fig. 585,			"
" Extractor, Fig. 588,	1¼	"	"

Horse Powers.

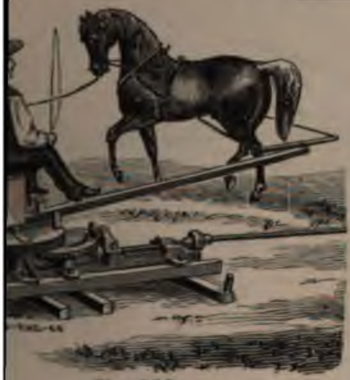


Fig. 558.

Fig. 558 shows our Fast Motion Pony Power for churning, ice cream freezing, and any other use requiring considerable speed. The tumbling rod makes 24 revolutions to the horse one, and horse will make about three revolutions per minute, giving a tumbling rod speed of about 70 revolutions per minute.

Fig. 98 Power, is made both for drilling purposes, shelling corn, and like uses. It is made single gear or double gear, and speeds and other information are given in price list on next page.

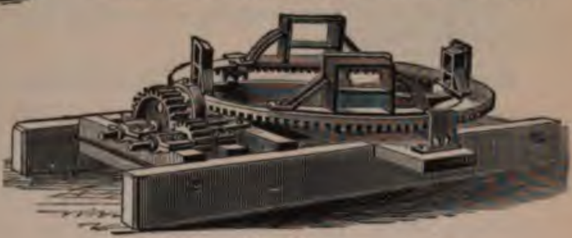


Fig. 98.

1607 shows our two pin-
er, one engaging the teeth
tom of master wheel, and
n the top on opposite sides
thus evenly dividing the
power is made both mounted or unmounted. Master wheel is large and heavy, in fact, strong enough for 10 to 12 horse-power. It is of unusually large diameter, as will be seen by reference to price list on next page.

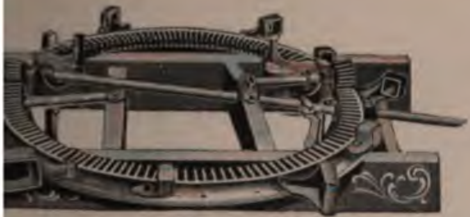


Fig. 1607.

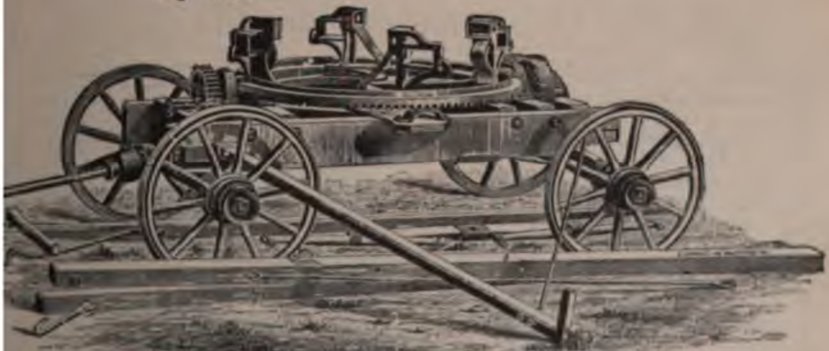


Fig. 366.

366 shows our Horse-Power for drilling and for general purposes. It is made both single
gear, mounted and unmounted, and is a first-class power in every respect, the wheels
l instead of wood as shown.

Horse Powers, Continued.

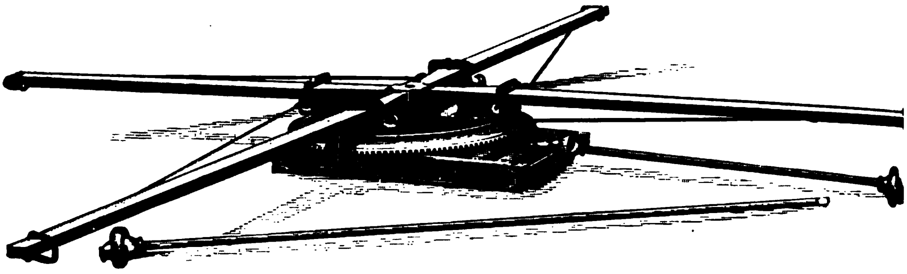


Fig. 1606.

Fig. 1606, Heavy Drilling Power, is a favorite with well drillers. The master wheel is of la diameter to give proper drops per minute with drilling machine, and it is heavy and well made.

PRICES OF HORSE POWERS.

DOUBLE GEARED.

Style Power. (Dec. 1st, 1899.)	Horse Power	No. Swps, Clevises.	Tumbling Rods† (6 & 12 Ft.)	H. P. Coupling.	Teeth M. Pinion.	Teeth M. Wh'l.	Teeth D. Gear Pinions.	Rev. T. Rod to 1 of Horse.	Diam. Master Wheel, Ft.	Apx. Wts.	Code.	P
Fig. 98	**1**	1	2	3	11	78	13 & 26	**14.**	2½	430	Habbe	$
" 98	**2**	2	2	3	12	92	13 " 26	**15.3**	3⅓	575	Hacce	
" 98	**4**	2	2	3	12	110	17 " 26	**14.**	4	1200	Hadde	
" 98	**4**	2	2	3	12	110	12 " 36	**28.5**	4	1100	Haffe	
" 366 (Unmounted.)	**8**	4	2	3	12	124	17 " 26	**15.8**	4½	1500	Hagge	
" 366	**8**	4	3	4	12	124	17 " 26	**15.8**	4½	2100	Hakke	
" 1606	**2**	2	3	4	12	110	17 " 26	**14.**	3 5-6	700	Halle	
" 1606	**4**	4	2	3	12	125	17 " 26	**15.9**	4 5-6	1200	Hamme	
" 1606 (Mounted.*)	**4**	4	3	4	12	125	17 " 26	**15.9**	4 5-6	1950	Hanne	

SINGLE GEARED.

Style Power. (Dec. 1st, 1899.)	Horse Power	No. Swps, Clevises.	Tumbling Rods† (6 & 12 Ft.)	H. P. Coupling.	Teeth M. Pinion.	Teeth M. Wh'l.	Teeth D. Gear Pinions.	Rev. T. Rod to 1 of Horse.	Diam. Master Wheel, Ft.	Apx. Wts.	Code.	P
" 558	**Pony**	1	2	3	....	......	....	**24.**	....	200	Happe	
" 98	**1**	1	2	3	11	78	....	**7.**	2½	400	Hasse	
" 98	**2**	2	2	3	12	92	....	**7.6**	3⅓	550	Hatte	
" 98	**4**	2	2	3	12	110	....	**9.1**	4	850	Hawwe	
" 366 (Unmounted.)	**8**	4	2	3	12	124	....	**10.3**	4½	1400	Haxxe	
" 366	**8**	4	3	4	12	124	....	**10.3**	4½	1900	Hazze	
" 1606	**2**	2	2	3	12	110	....	**9.1**	3 5-6	6:0	Hebca	
" 1606	**4**	4	2	3	12	125	....	**10.4**	4 5-6	1100	Hecda	
" 1606 (Mounted.*)	**4**	4	3	4	12	125	....	**10.4**	4 5-6	1900	Hedba	
" 1607	**8**	4	2	3	11	150	....	**13.6**	6 1-6	2000	Hefca	
" 1607 (Mounted.*)	**8**	4	3	4	11	150	....	**13.6**	6 1-6	2600	Hegda	

* Neckyoke and set doubletrees furnished with each mounted power.

† Unmounted powers have one long and one short tumbling rod and 4 iron stakes. **Mount** powers have two short and one long tumbling rod and 4 iron stakes.

Price each for horse power **Equalizers** for 2 horse and larger powers..........................

HORSE-POWER REPAIRS.

Horse Power for	1	2	4	4 H. P. X H'vy.	FIG. 366. 8 H. P. Common.	FIG. 1607. 8 to 12 H. P.
Wheel	$9.50	$16.00	$21.00	$29.40	$36.00	$50.00
nion, Cast iron	2.10	2.70	2.75	3.75	5.00	4.00
inion Cast Cast-steel	6.30	8.10	8.25	11.25	15.00	12.00
er Eye	1.50	2.00	3.00	4.20	5.25	3.75
d Eye	1.00	1.00	1.00	1.40	1.75	1.50
h Side	1.10	1.50	1.75	2.50	2.50	2.20
r	0.60	0.75	0.75	1.05	1.35	1.50
ter Post	1.35	1.70	2.00	2.80	3.50	..
ter Post Cap	0.25	0.25	0.25	0.35	.50	....
ver Boxes	1.70	2.10	2.50	3.50	3.50	(Low, $3.15 (High, 4.00
ion Shaft	1.70	2.10	3.00	4.10	5.00	(3.70 (Main, 8.00
bling Rod, Long	2.50	3.00	3.75	5.25	6.50	$5.70
bling Rod, Short	1.70	2.25	3.00	4.10	5.25	4.00
ent Coup, Fig. 243	1.70	2.00	2.50	3.50	5.00	5.00
gs, per pair Fig. 244, with Rivets	0.75	1.00	1.50	2.00	2.00	2.00
ent Yoke, Fig. 245	0.85	1.25	1.50	2.00	2.00	2.00

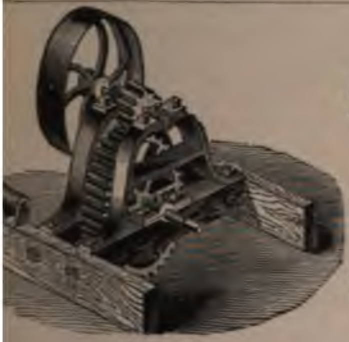


Fig. 94.

FIG. 94, No. 8.

SPUR JACKS,

To increase the motion of Our HORSE-POWERS...

Bevel Geared Jacks, same price as Fig. 94. State requirements and speed wanted.

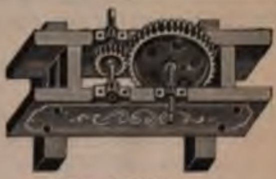


Fig. 1608.

Fig. 1608 is a Speeding or Reducing Jack, used for increasing or diminishing the speed of the tumbling rod of the horse-power.

SWIVELED HORSE-POWER COUPLINGS.

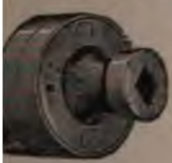


Fig. 243.

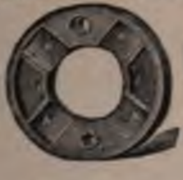


Fig. 244.

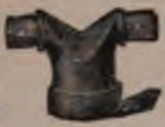


Fig. 245

STRAIGHT PULLEY JACK.

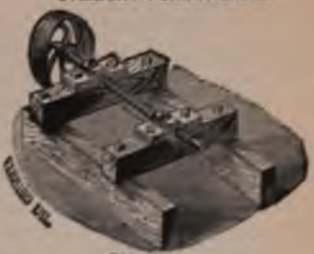


FIG. 246.

PRICE LIST OF JACKS, SPEEDERS, REDUCERS AND COUPLINGS.

Horse Power for	1	2	4	8	12
e of Tumbling Rod Coupl'g, Fig. 243	$1.70	2.00	3.50	5.00	6.00
m. of Tumbling Rod Coupl'g, Inch	1⅛	1⅛	1¼	1⅜	1⅜
e of Fig. 94	$20.00	20.00	25.00	30.00	35.00
e of Fig. 246 with pulley and crank plate for pumping	15.00	15.00	20.00	25.00	35.00
e of Speeding and Reducing Jack, Fig. 1608	15.00	15.00	20.00	25.00	35.00

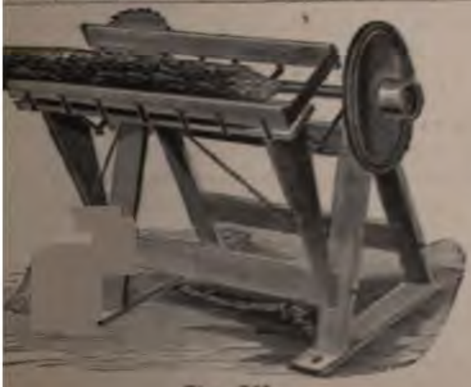


Fig. 311.

...WOOD SAW...

FIG. 311.

This saw is made strong and durable. Is one of the very best and most convenient in the market. Is fully guaranteed in every particular. Can be run by two horses with ease.

Price, $44.00, with 20-inch Saw.
Price, $45.00, with 22-inch Saw.

Size of Pulley, on Saw Arbor, 8-inch face; diameter, 5 inches.

The saw should be run at a speed of 600 to 1,000 revolutions per minute.

The Aurora Gasoline and Gas Engines.

THESE engines are the result of thirty years experience in manufacturing and of careful experimenting and testing to produce an engine which combines simplicity, economy, durability, low cost. It starts easily and certainly.

We manufacture an engine which combines the essential features of a perfect gasoline or gas engine We fully recommend it for driving air compressors, well drilling machinery, electric motors, dynamos, general machinery, grinding mills, irrigating, water works and domestic pumps, and have special patterns for traction rigs, threshing, sawing and well drilling engines.

THE AURORA has but one adjustment, all other parts being permanently keyed or fixed in place. An inexperienced purchaser cannot get the engine parts out of time by adjustment. There are no set screws to slip and make him wish he had never been born. The engine will start quickly and easily when the user gets ready and it will run his machinery until he gets ready to stop it.

COST OF RUNNING.

The cost of running varies in different localities depending upon the cost of gasoline, but may be taken under ordinary conditions as varying from 1-4 the expense of steam power where coal is high to some in excess of half the expense of steam where coal is comparatively low as approximately shown in the following comparisons for 10 hours run, with coal at $2.00 per ton and gasoline at 8c per gallon.

TWO HORSE POWER.

GASOLINE ENGINE.		STEAM ENGINE.	
Gasoline,	$ .20	Coal,	$ .28
Oil, etc.,	.05	Oil, etc.,	.05
Attendant,	.10	Engineer,	.50
Total,	$ .35	Total,	$ .83

FIFTEEN HORSE POWER.

GASOLINE ENGINE.		STEAM ENGINE.	
Gasoline,	$1.20	Coal,	$1.50
Water,	.01	Water,	.10
Oil, etc.,	.20	Oil, etc,	.20
Attendant,	.20	Engineer,	1.75
Total,	$1.61	Total,	$3.55

RUNNING WELL SINKING MACHINERY.

For driving well sinking machinery a gasoline engine is especially adapted. It may be mounted on the machine itself, a portable, or a traction engine. It saves time getting up steam, stops expense when not working, is lighter than steam engine to move, takes less water to operate and the full expense is less.

DEEP WELL PUMPING.

For pumping deep wells gasoline engines have no equal, taking into account cost and results. Water does not have to be stored in large tanks to become unfit for stock as with wind mills. Farm stock never drinks filthy, nor warm water if it can get any other. It likes the best and will do enough better on good water pumped as required to warrant expenditures for a first-class gasoline plant far in excess of our prices.

GUARANTEE.

We guarantee our Gasoline Engines to be of good material, made in workmanlike manner; that they will do the work represented when properly operated, and that we will furnish without charge at factory any piece broken within one year from date of purchase, if proved defective.

'he Aurora Stationary Gasoline or Gas Engine.

g. 1703 is made from a photograph of one of our medium sized single stationary gasoline s.

is engine has extra large steel shaft, long piston head for durability, automatic oiler on 5 horse- and larger, working parts permanently secured. The smaller sizes have double width pulley. ger sizes have single width pulley, but may be fitted with friction clutch pulley at a small addi- cost when desired.

ch engine is fitted with appliance for starting easily in cold winter weather, a feature which is nt in engines used in exposed places. All are positive feed engines. Five horse-power and re fitted with gasoline pump, permitting large gasoline storage tank to be used and set outside ling. Four horse and smaller have gravity feed, but may be fitted with gasoline pump and torage tank the same as larger engines when desired, at a small additional cost.

e also build Fig. 1703 with deep well pumping attachment on same base for pumping deep vithout using a cumbersome pump jack and belt.

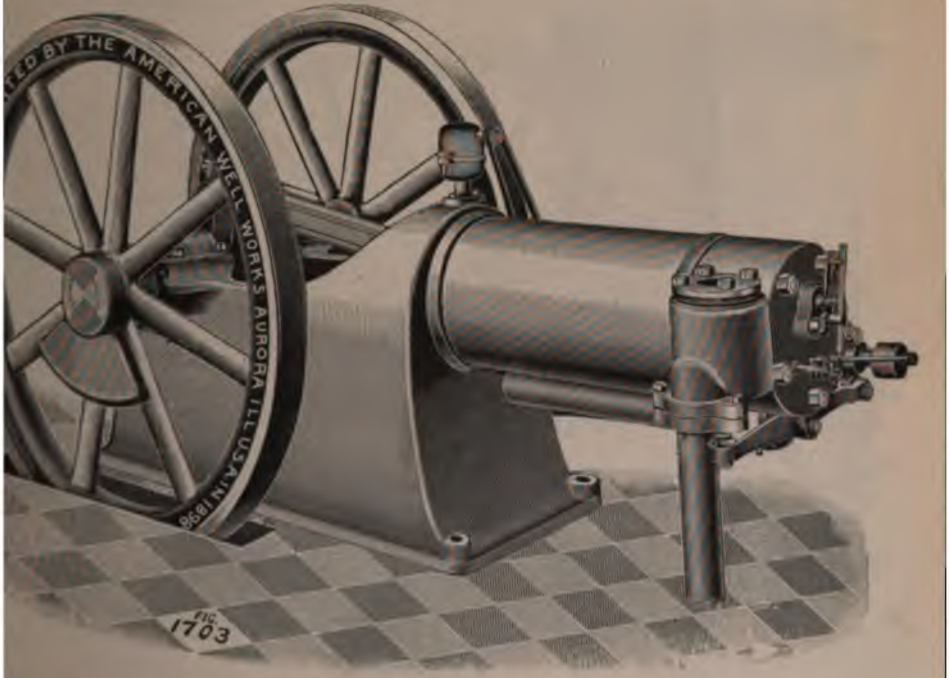

TED BY THE AMERICAN WELL WORKS AURORA ILL.U.S.A. IN 1898

FIG. 1703

'e manufacture Fig. 1703 of latest style to date of purchase in sizes 2, 3, 4, 5, 6, 8, 10, 16, 18, 20, 25, 35, 50 and 60 horse-power.

'e furnish with each engine:
- Gasoline Tank.
- Gasoline Pipes.
- (Engines with pump, 20 feet).
- Water cooling tank with cocks.
- Water piping (4 ft. from tap with union)
- Exhaust Muffler. Muffler Fittings, only.
- Battery (Single).
- Spark Coil.
- Electric Switch.
- 20 feet connecting Wire.
- 1 Monkey Wrench.
- 1 Pipe Wrench.
- 1 Special Wrench (for sizes needed).

you can arrange water cooling circulation without getting water cooling tank and pipe, we duct.

dynamo with pulley and belt for same wanted, to get the best, we will omit battery and add at small net additional cost.

rices.—Write us stating size you need, always mentioning what the heaviest work you have to y be, whether water tank and pipe required, whether battery, dynamo, or tube igniter preferred, er you wish friction clutch pulley on engine or regular pulley, and when engine wanted is to a pulley already in place state its diameter, width of face and number of revolutions per minute. ceipt of this information we will quote our close net price.

The Aurora Portable Gasoline Engine.

Fig. 1704 is made from a photograph of one of our 15 horse-power gasoline engines.

This particular engine is running a large sized 1000 foot well sinking machine which combines Chapman's patent revolving hydraulic process and cable drilling tools.

It is fitted with electric starter and with dynamo for generating a continuous electric current for firing the charge, thus insuring constant and satisfactory operation.

It is also fitted with water cooling circulation pump, tank and fittings; gasoline pump, tank and fittings.

It has automatic cylinder lubricator which starts and stops when engine does.

It is mounted on steel I beams, steel axles and wheels, is provided with drains and all trimmings complete, ready to run.

All sizes start easily in summer or winter by the use of our improved fixtures and cannot fail to give excellent satisfaction.

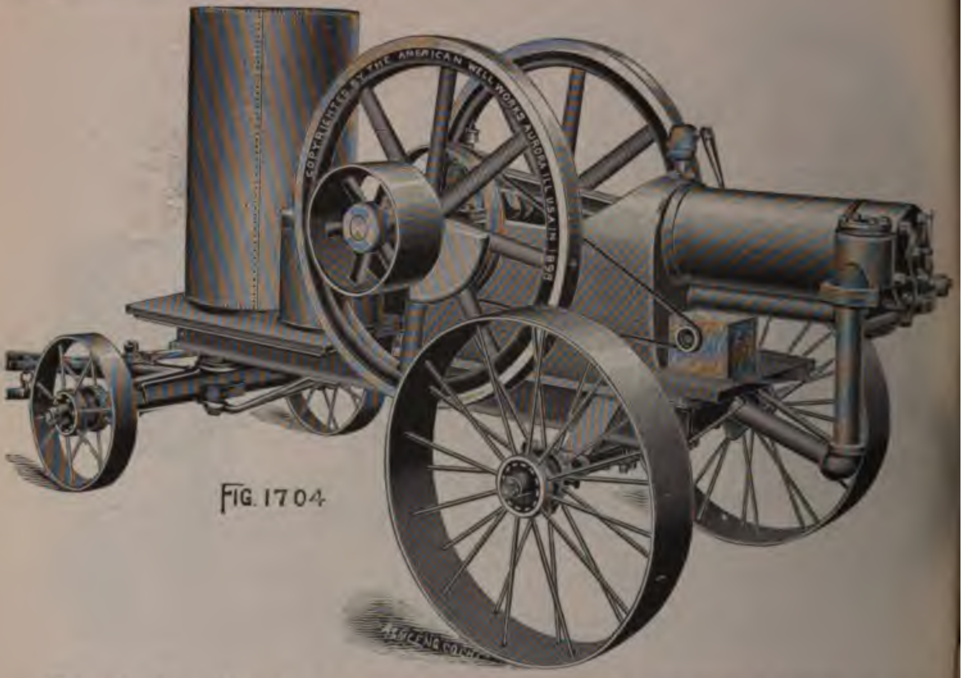

THE AMERICAN WELL WORKS AURORA, ILL. U.S.A.

FIG. 1704

This style of portable engine is a very serviceable outfit for uses requiring a portable power producer. A farmer with one of these engines can do his own shelling, grinding, shredding, husking, threshing, water pumping, etc. It is also especially covenient for running well sinking or prospecting machinery. When desired, the engine may be mounted on same trucks with well sinking machine, although in the larger sizes it is better to have engine on separate truck for convenience in moving.

We manufacture Fig. 1704 in latest style to date of order, and in sizes 5, 6, 8, 10, 12, 15, 16, 1 20 and 25 horse-power.

We fit these engines with dynamo electric, battery electric, or tube igniters as may be preferred, but furnish double battery unless otherwise ordered.

The dynamo electric sparker is the best to be had and costs you but little more than battery or tube igniter.

Prices.—We will make you net prices which cannot be beaten for a high grade engine on receipt of information as to your requirements. State whether you wish regular pulley on engine shaft or *want friction clutch pulley* at small additional cost.

Instructions for operating furnished to purchaser.

The Aurora Traction Gasoline Engine.

ig. 1705 is made from a phograph of our 18 horse-power traction gasoline engine.

he engine itself is our regular high grade Fig. 1703 engine, thoroughly built, and made to stand duty required of a traction.

is mounted on steel I beams which in turn are supported by heavy steel axles and ground s, the driving wheels having very wide faces. The pinions are of steel.

water cooling circulation pump, tank and fittings; a gasoline pump, tank and fittings; a dynamo nerating electric ignition spark and attachments, are all furnished complete.

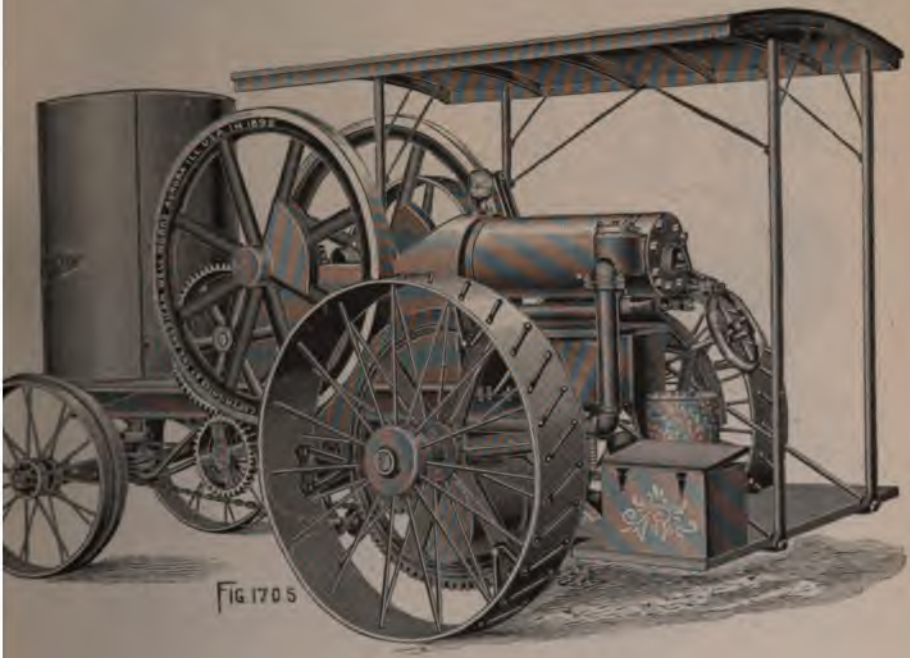


FIG 1705

This engine runs independent of all traction gearing when set on a job. When on the road, the n of the ground wheels may be reversed instantly by simply moving reversing lever forward or ward. A suitable brake is provided. The steering apparatus is of the best and one man or boy tes engine easily on the road. We fit regular pulley on engine shaft of desired diameter for ary purposes, but for driving threshing machines you should arrange for friction clutch pulley on e at small additional cost.

We make Fig. 1705 in five sizes—12, 16, 18, 20 and 25 horse-power.

Prices.—Write us for net price of the size you need, stating whether you desire regular pulley or n clutch pulley. If you desire an engine to operate machines which you have now, state eter and width of face of their driving pulleys, and the number of revolutions per minute you each to run. If you desire us to furnish belt, you should, where possible, state length, width, ind you desire.

The Aurora Duplex Gasoline and Gas Engine.

Fig. 1706 is made from a photograph of one of our large sized duplex gasoline or gas
These engines are carefully and thoroughly built of selected material.
They are provided with gasoline pump, gasoline fittings, and gasoline tank for one day's
with 20 ft. each suction and return pipe.
Each engine is provided with our improved starter with which one man can start the largest
Crank pins are fitted with centrifugal oilers and floor stands neatly finished, not shown in
Each engine is regularly fitted with pulley on shaft at side of balance wheel, but may be fitted
gear or rope pulley for driving, irrigating or other machinery.
A heavy forged shaft turned true is used, running in ample bearings fitted with quarter boxes.
The crank plates are pressed on shaft by hydraulic pressure, double keyed and neatly finished.
Wrist pins are of forged steel, pressed in and firmly secured.
Heavy brass boxes properly re-inforced are used on wrist and cross-head pins.

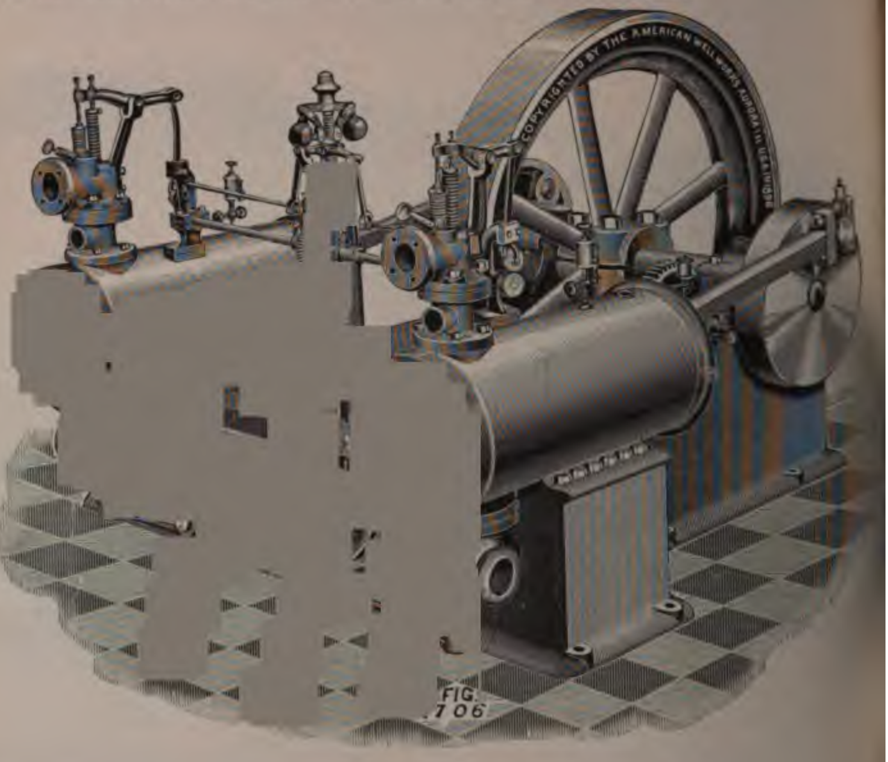

COPYRIGHTED BY THE AMERICAN WELL WORKS AURORA ILL

FIG. 706

Pistons are made long with cross-head at center evenly distributing the load.

Bed castings are heavy and solid, holding engine in perfect aligment.

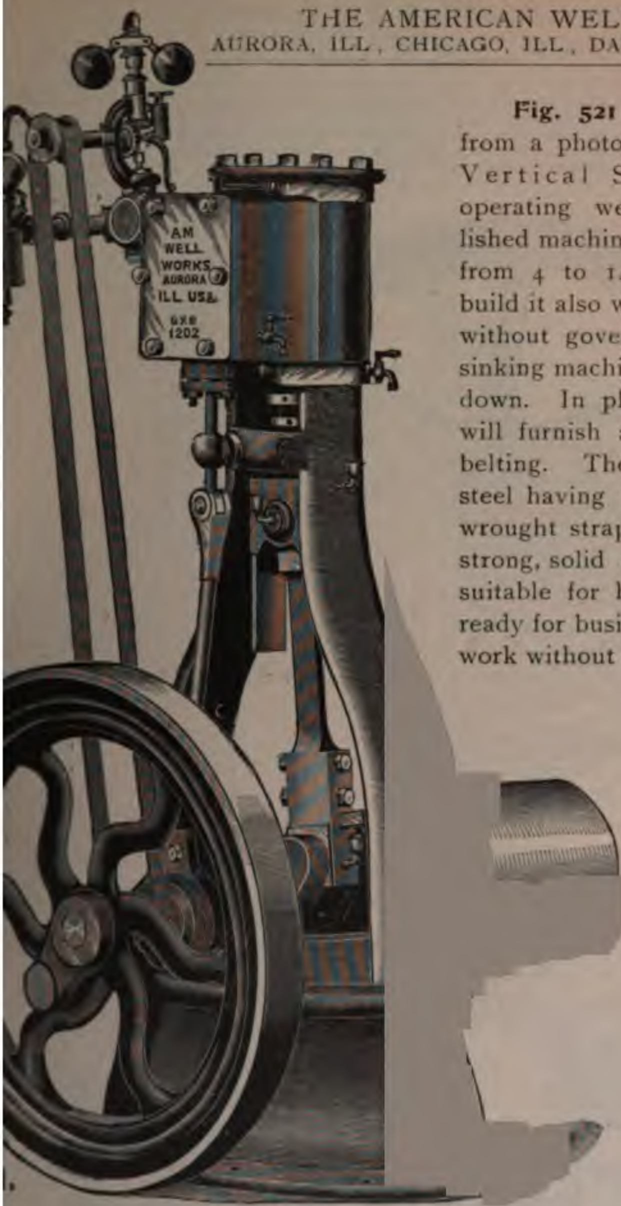
Our improved sparker for firing the charge has no parts inside of engine which are liable to out of order.

This style of engine is especially adapted to constant and heavy work, such as running machinery, electric light plants, water works plants, irrigation plants, and similar duty.

It possesses an advantage in receiving an impulse at each revolution, of being constructed long stroke and extra long connecting rods, thus making a longer lived and more economical than short stroke, short connecting rod, vertical duplex engines.

We build this style engine from 60 to 150 horse-power, embodying the latest improvements date of order.

Prices.—When inquiring for prices state purpose for which engine is to be used, mentioning whether or not you desire us to figure on water cooling tank and accessories. Also, on large storage tank, or tanks, where it is desired to purchase gasoline by carload. We will on receipt, net price estimate.



1.

Fig. 521 is a picture made from a photograph of one of our Vertical Steam Engines for operating well sinking or established machinery. Made in sizes from 4 to 14 horse-power. We build it also with link motion, and without governor for driving well sinking machinery, mounted or down. In place of the pulley we will furnish a sprocket for chain belting. The crank is of forged steel having bronze boxes and wrought straps. It is well built, strong, solid and substantial, and suitable for heavy duty. Always ready for business, gets down to its work without a tremble.

Price List and Particulars of Self-Contained Vertical Engine.

ower	4	5	6	8	10	14
ylinder, inches	4	5	6	6	7	8½
troke, inches	5	5	6	8	9	9
per minute	250	250	225	180	160	160
m Pipe, inches	¾	1	1	1	1¼	1½
aust Pipe, inches	1	1¼	1¼	1¼	1½	2
Shaft, inches	1 11-16	2	2¼	2¼	2 7-16	2 11-16
haft, inches	24	32	32	36	40	48
Fly Wheel	24	24	32	36	36	48
Wheel, inches	4	4	5	6	6	7½
ly Wheel in lbs. approx	115	115	200	350	350	600
Governor and Oil Cups	$75.00	$ 90.00	$105.00	$125.00	$140.00	$190.00
Oil Cups and without Governor	62.00	$ 76.00	91.00	111.00	124.00	172.00
Reversible Link, Oil Cups, and no Governor	75.00	90.00	105.00	125.00	140.00	190.00
Reversible Link, Governor and Oil Cups	87.00	103.00	119.00	139.00	155.00	206.00

Fig. 799 shows our Standard Oil Well Drilling Engine for driving well machinery. As here show balance wheel is sectional for sinking wells with the cable system. (We furnish our standard balance whe other uses.) It has steel shaft; all made heavy and substantial for the rough use it is subject to in sinking w at the same time, finished in a first-class manner. It is furnished with a throttle-valve and lubricators.

Boiler Feed Pump is not furnished unless especially ordered, and then at an additional price.

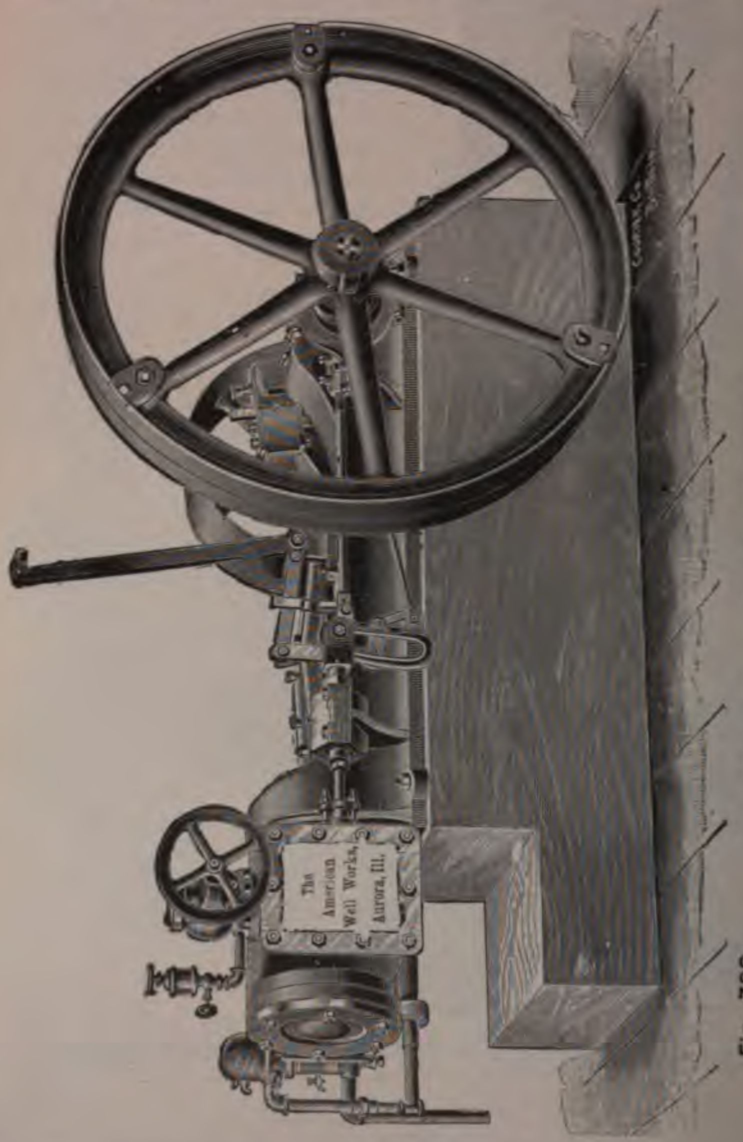


Fig. 799.

THE AMERICAN
STANDARD OIL WELL DRILLING ENGINE.

Prices and Dimensions of Fig. 799 Oil Well Drilling Engines, Double and Single.	Single Engines, with and without Link motion.				Double Engines, with an without Link motion.		
No. Horse Power	10	15	20	25	20	30	40
Diam. of Cyl., In.	7	8	9	10	7	8	9
Length of Stroke, In.	9	12	12	12	9	12	12
pprox. Weight, lbs.	1200	2400	2800	3200	2600	5100	6000
e with Link Motion for reversing	$220.00	320.00	360.00	380.00	$470.00	680.00	770.00
without Link motion	$200.00	290.00	320.00	340.00	$430.00	630.00	720.00

Fig. 1186 shows our smallest pattern (7 x 9) Compound Steam Driven Engine, for driving well sinking and r machinery where fuel for generating steam is expensive. The advantage in using two engines is that they be started at any point, and that they will start very slowly, and pull heavy and slow, which is very often at advantage to the operation of well sinking machinery. When raising and lowering pipes, it can be raised lowered to the point exactly as required. Larger sizes are of the pattern similar to our Oil Well Drilling ine, Fig. 799. We make it single and double, using steam the second time. We have estimated in this table the horse power is increased ½ by using the steam the second time, and without any additional cost for of running expenses.

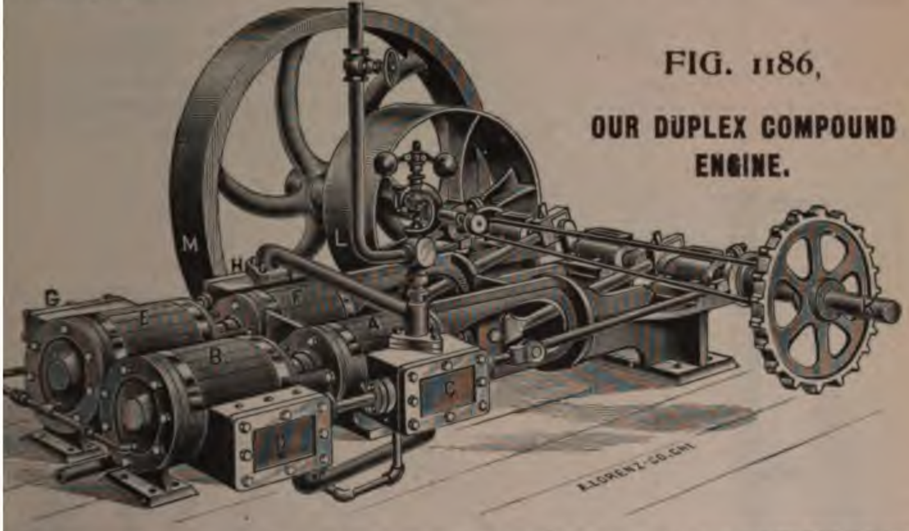


FIG. 1186,

OUR DUPLEX COMPOUND ENGINE.

Well Sinking Compound Engines **Fig. 1186.**	Single Engine. (Uses Steam Compound.)				Double Engine. (Uses Steam Compound.)			
orse Power	13	20	26	33	26	40	53	66
, of first Cylinder	7	8	9	10	7	8	9	10
eter of second Cylinder	10	11¼	12⅝	14	10	11¼	12⅝	14
th of Stroke	9	12	12	12	9	12	10	12
r Fig. 1186 with Governor, Oil Cups, Lubricators and Trimmings	$300.	$385.	$426.	$450.	$575.	$840.	$960.	$986.

Fig. 1613 is made from a photograph of one of our Double Link Motion Engines. This particular design is used only on the smallest size. The larger sizes are made of design Fig. 799, our oil well pattern. They are elegantly adapted for operating well sinking machinery, as they will start slowly and pull heavily, and with the double engine it cannot stop on the center, with link motion for hoisting, heavy loads can be raised or lowered as fast or slow as required. The advantage of this class of engines is so well known by engineers that it requires no further description. **Made with and without link motion.**

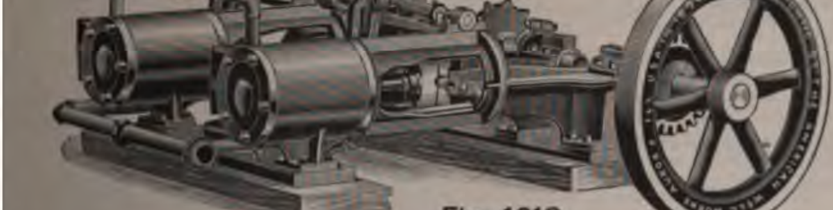


Fig. 1613.

ces and Dimensions of **Fig. 1613** Single and Double Drilling Engines.	Single Engines with and without Link Motion.				Double Engines with and without Link Motion.			
orse Power	10	15	20	25	20	30	40	50
. Cyl. in inches	7	8	9	10	7	8	9	10
gth of stroke, inches	9	12	12	12	9	12	12	12
proximate Weight, lbs	1200	2400	2800	3200	2600	5100	6000	6800
e with Link Motion	$230.	$320.	$360.	$380.	$470.	$680.	$770.	$820.
e without Link Motion	200.	290.	320.	340.	430.	630.	720.	740.

CHAPMAN'S AUTOMATIC CUT-OFF ENGINE.

Fig. 1641 is made from a photograph of our Standard Self-Contained Engine, with Chapman's Patent Automatic Cut-off Governor in balance wheel for regulating the speed of the engine, by cutting off the steam at various points in the stroke so as to give the benefit of the expansion of steam; thus, if but one-third the power of the engine is required, it would cut off the steam at from 1-5 to ¼ the length of the stroke, taking the benefit of the expansion of steam. This feature will be found a very great saving in the expense of running an engine. We make it for all sizes required, and can put this improvement on to any of our engines. The crank is of forged steel, and every part about the engine is first-class. **It is the most economical engine for propelling any machinery.** By getting it of one-third greater horse power than the amount of power ever required, the benefit of the expansion of steam can be gotten, the same as is obtained by the Corliss or compound type of Engine, and for engines less than 50 horse power, this is much more preferable. We furnish with this engine, the engine as shown, complete, but not the foundation.

In comparing an engine driven with a face plate, with an engine driven by a crank, you will note that the crank is much preferable, as it has a bearing on each side of the power applied; is more durable, wears better, and has less friction. Can be operated by an ordinary person, while a face plate engine requires a skillful engineer to continually adjust its bearings as it wears.

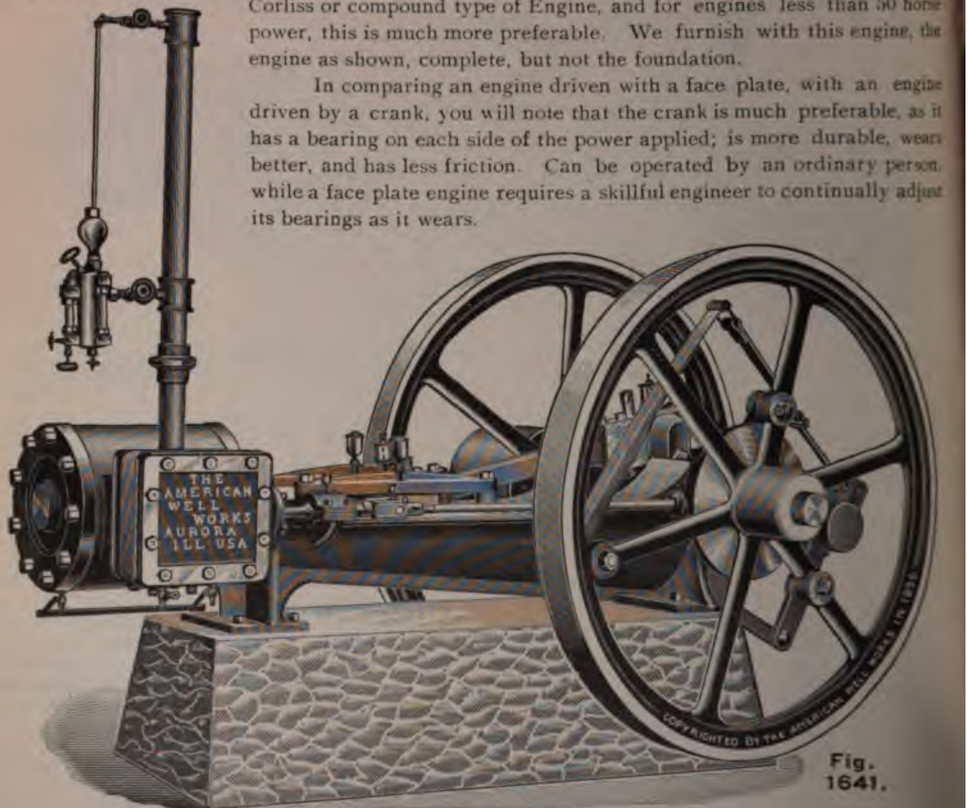

THE AMERICAN WELL WORKS AURORA ILL. USA
COPYRIGHTED BY THE AMERICAN WELL WORKS IN

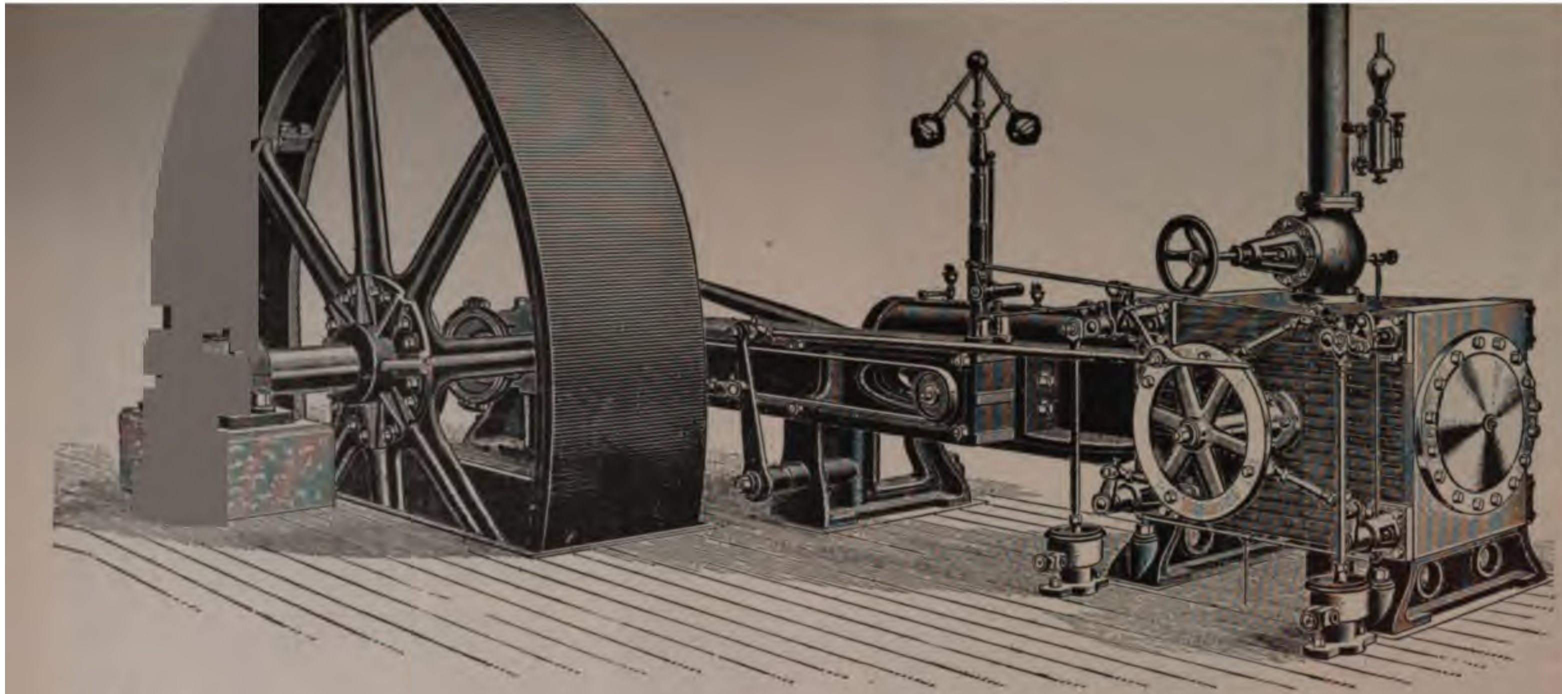
Fig. 1641.

Prices for Automatic Engine, Fig. 1641, includes Globe Valve, Lubricator, Supply Pipe, Pet Cocks, Oil Cups, with a Parellel for Opening and Closing the Pet Cocks together.

Prices and Dimensions of **Fig. 1641**, with our **Chapman's Patent Automatic Cut-off**, for **Single** as here shown: or **Double Engine** as shown by **Fig. 1613** without link motion.	**Single Engine with Automatic Cut-off.**				**Double Engine with Automatic Cut-off.**			
	To increase the Horse Power, increase the speed.							
No. of Horse Power		15 to 25	20 to 32	25 to 40		30 to 50	40 to 64	50 to
Diam. of Cylinder, inches		8	9	10		8	9	10
Length of Stroke, inches		12	12	12		12	12	12
Approximate Weight, lbs		2500	3006	3500		5300	6400	7300
Price with Automatic Cut-off as shown	$ –	$390.00	$425.00	$450.00	$	$830.00	$930.00	$1000.0

Rule for computing Horse-Power of Engines.

Square the diameter of the cylinder in inches, multiply that by the velocity in feet per minute; divide by 1000; that gives the horse power at 60 lbs steam pressure in cylinder.



OUR CORLISS ENGINE FIG. 1225, the Most Improved Pattern and Highest Duty Attainable.

Fig. 1225 shows our Corliss Engine, which we will make of any horse power required, within the range of possibilities. We will either mount it on a cast iron or steel frame. As our class of machinery requires the very best composition of iron, we make castings which are *par excellence.* To parties desiring to purchase we extend an invitation to have them visit our works and see the magnificent machinery we have in our factories, which are of the highest grade, and of the best finish, and we pride ourselves on our plant as being the best appointed works that human ingenuity can devise, and money purchase. In placing your orders with us, you can rely on the very best of work, and the highest duty. Correspondence solicited.

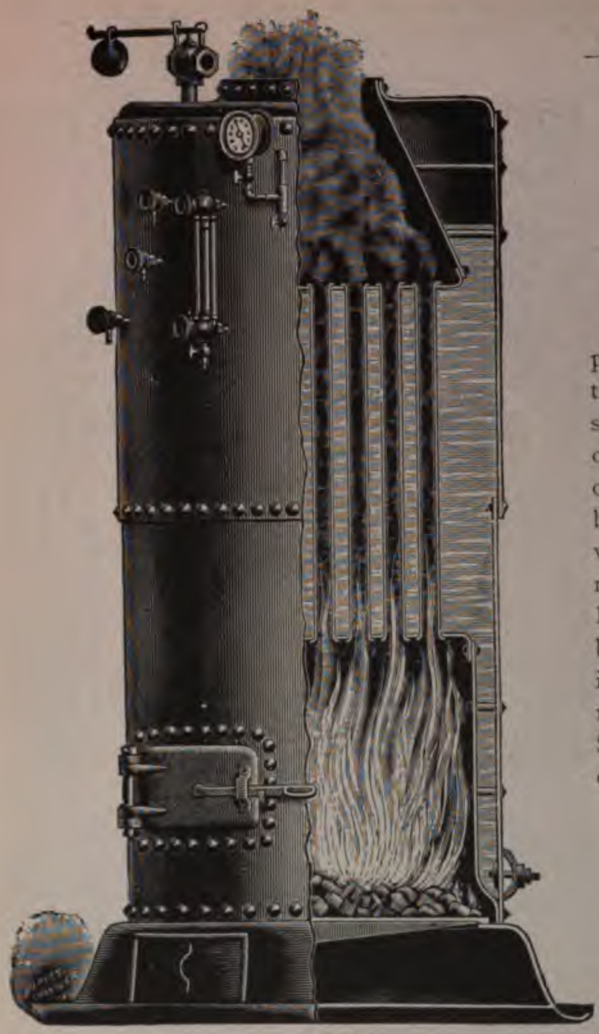


Fig. 1331.

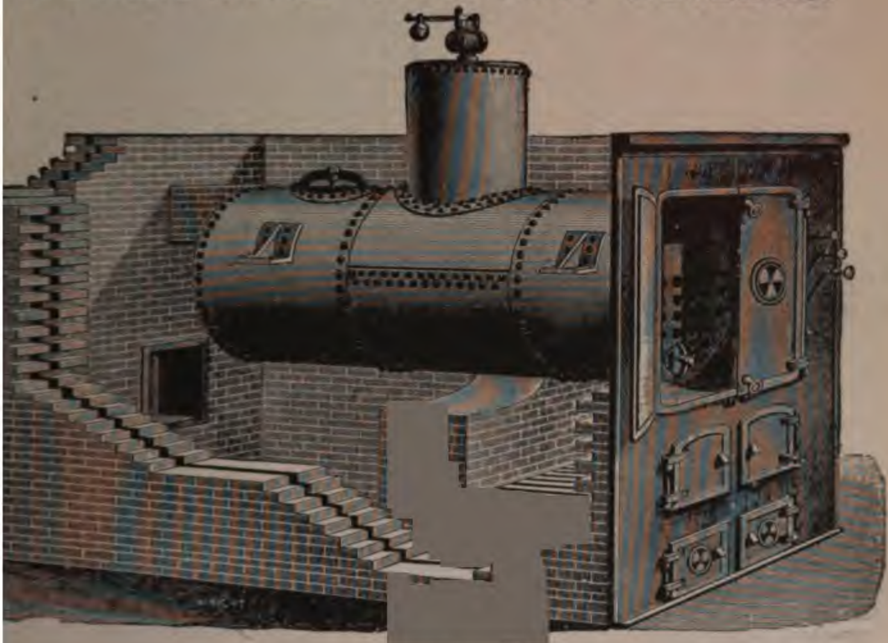
Fig. 1331 shows ou
proved Submerged Flu
tical Boiler, for gene
steam for propelling e
or pumps. This meth
construction produ
boiler very superior t
vertical boiler having it
not covered with w
It does not burn ou
become leaky. Stac
included. The boile
made of 60 thousand
Steel. Prices for large
on application.

Prices and Dimensions for our Vertical Boiler, Fig. 1331.

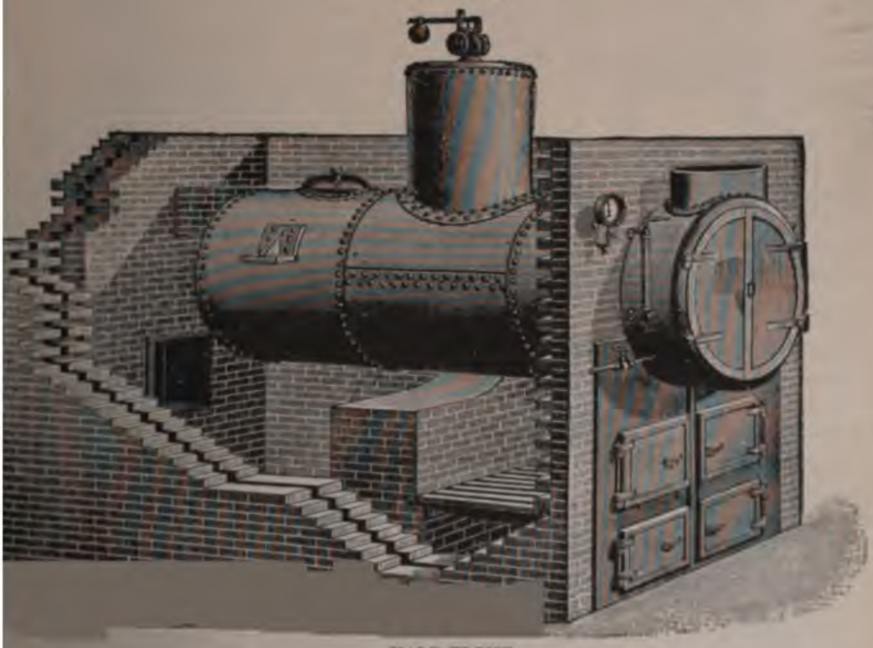
No. H. P.	4	5	6	8	10	12	14	16	18	20	25
Diameter	24	24	24	30	30	36	36	36	36	42	42
Height in inches	54	60	66	72	84	72	78	84	96	96	108
Height Fire Box	24	27	27	27	27	30	30	30	30	30	30
No. of Tubes	13	13	13	19	19	30	30	30	30	40	40
Diameter of Tubes	3	3	3	3	3	3	3	3	3	3	3
Length of Tubes	16	18	24	30	36	27	33	39	51	48	57
Thickness of Shell	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼	¼
" " Fire Box	5-16	5-16	5-16	5-16	5-16	5-16	5 16	5-16	5-16	⅜	⅜
" " Heads	5-16	5-16	5-16	5-16	5-16	⅜	⅜	⅜	⅜	⅜	⅜
" " Cone	5-16	5-16	5-16	5-16	5-16	5-16	5-16	5-16	5-16	⅜	⅜
Price of base and grate	$12 50	$12 50	$17 50	$17 50	$17 50	$25 00	$25 00	$25 00	$25 00	$23 75	$23 75
Price of Glass Water Gauge	3 06	3 06	3 06	3 06	3 06	3 06	3 06	3 06	3 06	3 06	3 06
Price of Steam Gauge	5 00	5 00	5 00	5 00	5 00	5 00	5 00	5 00	5 00	5 00	5 00
Price of Guage Cocks	3 06	3 06	3 06	3 06	3 06	3 06	3 06	3 06	3 06	3 06	3 06
Size of Safety Valve	1	1	1¼	1¼	1½	1½	1½	1½	1½	2	2
Price of Safety Valve	2 30	3 75	3 75	3 75	4 37	4 37	4 37	4 37	4 37	7 50	7 50
Size of Blow-off	1	1	1	1	1	1	1	1	1	1	1
Price of Blow-off	2 30	2 30	2 30	2 30	2 30	2 30	2 30	2 30	2 30	2 30	2 30
Diameter of Stack	10	11½	11½	15½	15½	18	17	18	18	20	20
Price of Stack per feet	70	70	70	90	90	1 10	1 00	1 10	1 10	1 15	1 15
Weight of Boiler	600	700	1075	1250	1450	1600	1700	1930	2200	2600	3250
Weight of Boiler and Fixtures	1,000	1200	1500	1700	1900	2300	2100	2700	3200	3500	4200
Price fixtures, fittings, no stack	29 70	29 70	34 70	34 70	35 30	42 80	42 80	42 80	42 80	44 70	44 70
Price of Boiler with door	112 50	112 50	145 00	155 00	172 50	194 00	200 00	213 75	237 50	282 50	312 50
Price of Boiler and Fixtures complete, no stack	135 00	142 20	179 75	189 70	207 80	236 55	242 80	256 55	280 30	327 20	357 20

FIG. 888.

HORIZONTAL TUBULAR BOILERS.



FULL FRONT.



HALF FRONT.

FIG. 889.

We will make any style required.

HORIZONTAL TUBULAR BOILERS.

FIGS. 888 and 889.

Number of Boiler	1	2	A	5	B	6	7	C	8	D
HORSE-POWER	12	15	20	25	30	30	35	40	40	45
Diameter of Boiler, in.	36	36	36	42	42	44	44	44	48	48
Number of 3-inch Tubes	30	30	30	39	39	44	44	44	54	54
Length of Tubes, ft.	7	8	10	10	12	10	12	14	12	14
Size of Dome, in.	20 x 20	20 x 20	20 x 20	22 x 22	22 x 22	24 x 24	24 x 24	24 x 24	26 x 26	26 x 26
Thickness of Shell, in.	¼	¼	¼	¼	¼	9-32	9-32	9-32	5-16	5-16
" Heads, in.	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜
Weight of Boilers, about, lbs.	2100	2300	2600	3600	4200	4300	5000	5500	5600	6500
Diameter of Smoke Pipe, in.	18	18	18	20	20	22	22	22	24	24
Length " ", ft.	28	32	40	40	48	40	48	56	48	56
Weight of Fixtures, lbs.	1250	1300	1350	1500	1650	1700	2000	2100	2200	2300
Price of Steel Boilers, complete, with Half Front, Smoke Pipe and all Fixtures, except Injector	$283	$309	$352	$446	$500	$517	$555	$600	$629	$700
Price of Steel Boilers complete, with Full Flush Front, Smoke Pipe and Fixtures, except Injector	$317	347	389	483	541	558	597	643	672	749
Deduct if Smoke Pipe is not wanted	$27	30	32	43	49	49	53	67	73	85

HORIZONTAL TUBULAR BOILERS.

FIGS. 888 and 889.

Number of Boiler	10	E	F	11	12	13	15	16	17	18
HORSE-POWER	50	55	60	60	70	80	90	100	110	125
Diameter of Boiler, in.	54	54	54	60	60	60	66	66	72	72
Number of 3-inch Tubes	70	70	70	84	84	84	106	106	130	130
Length of Tubes, ft.	12	14	16	12	14	16	14	16	14	16
Size of Dome, in.	28 x 28	28 x 28	28 x 28	32 x 32	32 x 32	32 x 32	34 x 34	34 x 34	38 x 38	38 x 38
Thickness of Shell, in.	5-16	5-16	5-16	11-32	11-32	11-32	⅜	⅜	7-16	7-16
" Heads, in.	7-16	7-16	7-16	7-16	7-16	7-16	7-16	7-16	½	½
Weight of Boilers, about, lbs.	7000	8000	9000	9100	10000	12000	13500	15000	15000	17000
Diameter of Smoke Pipe, in.	28	28	28	30	30	30	33	33	36	36
Length " ", ft.	48	56	60	48	56	60	56	60	56	60
Weight of Fixtures, lbs.	2300	2400	2500	2600	2800	2900	3000	3200	3400	3600
Price of Steel Boilers, complete, with Half Front, Smoke Pipe and all Fixtures, except Injector	$770	$871	$925	$ 976	$1040	$1120	$1200	$1312	$1531	$1645
Price of Steel Boilers, complete, with Full Flush Front, Smoke Pipe and Fixtures, except Injector	$823	925	978	1029	1096	1176	1269	1378	1607	1721
Deduct if Smoke Pipe is not wanted	$ 85	91	101	115	124	133	133	151	151	169

The fixtures include full flush front, or half front with flue doors, anchor bolts, grate and bearing bars, back door and frame with anchor bolts, back stays and tie rods, safety valve, pressure gauge, water gauge, three gauge cocks and column, blow-off, check and stop valve, smoke stack with guy rods four times length of stack.

These boilers, shell heads and domes are made of the best open **hearth steel, sixty** thousand pounds tensile strength, thoroughly braced and stayed, and with double riveted horizontal and dome seams, as per United States regulations. All materials and workmanship warranted first-class.

Smoke stacks up to No. 8 size are No. 16 iron; D to 11, No. 14; No. 15 size and upward, No. 12 iron.

The Brick Work or Erecting is not included in above prices.

All our boilers are tested to one hundred and fifty pounds hydrostatic pressure, nd safe for one hundred pounds working steam pressure. Their *horse-power* rating is d upon the *effective heating surface,* and *fully* up to the *best engineering standard.*

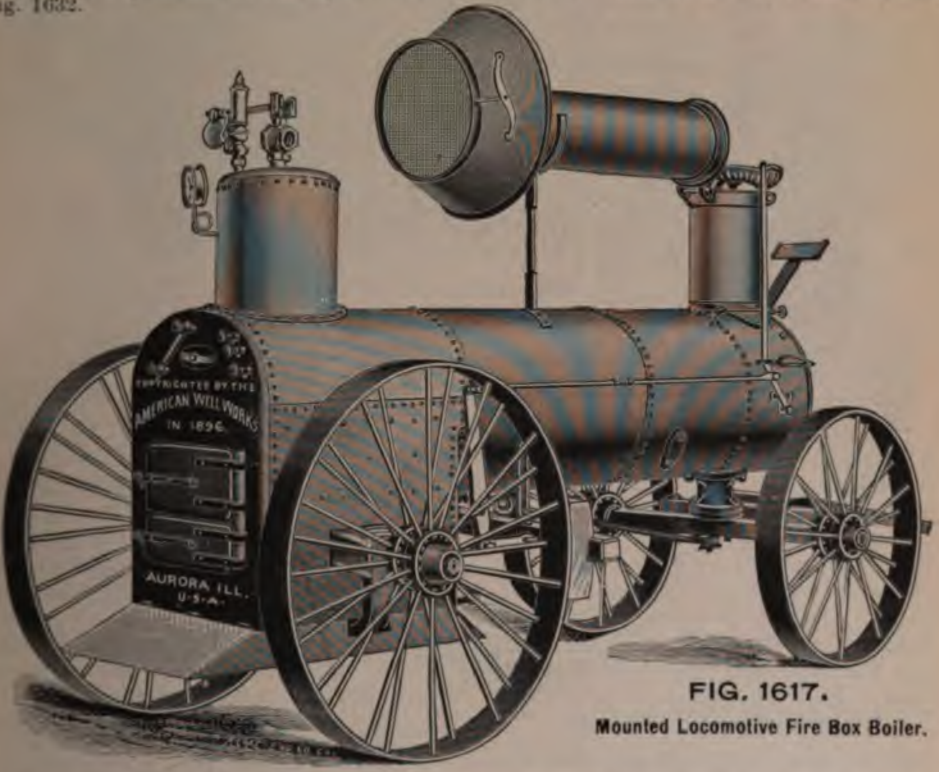
Fig. 1617 shows our Improved Mounted Boiler made of 60,000 lbs. tensile strength steel, with ash pan attached, having steel wheels and steel axles, with broad tires to better travel on soft roads; used for generating steam for propelling well sinking machinery, etc. The boiler sets loosely on to the bent axle, held in place by the lugs that are riveted to the boiler. By raising the fire box end of boiler, it lifts it up off of and out of the axle. The wheels can then be run out and used for other purposes if desired.

Prices include: Safety Valve, Steam Gauge, Water Gauge, Gauge Cocks and Fittings, Feed Pump and belongings, Blow-off, Poker, Scraper, and Ash Hoe.

Prices for larger or smaller sizes will be quoted with specifications on application.

Where more than 30 horse-power is required, two boilers should be used to better enable them to travel on soft roads, over bridges, etc.

We will furnish two Injectors, either capable of filling the boiler in place of the one boiler feed pump, if preferred, at same price. For style of stack furnished see our Cormish Boiler, Fig. 1632.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AURORA ILL. U.S.A.

FIG. 1617.

Mounted Locomotive Fire Box Boiler.

Prices and Dimensions for FIG. 1617 Mounted or on Skids. **(Spark Arrestor not included.)**

No. of Horse Power	10	15	20	25	30
Diam. of Boiler, inches	30	32	34	36	36
Height of Fire Box, inches	34	38	38	40	40
Width of Fire Box, inches	24	26	28	30	30
Length of Fire Box, inches	38	44	54	54	61
No. of Flues	22	26	30	34	34
Diam. of Flues	3	3	3	3	3
Length of Flues	72	78	90	96	102
Diam. of Smoke Stack, inches	14	15	16	18	18
Length of Smoke Stack, ft	18	20	24	24	24
Approx. Weight not mounted, (on skids)	3400	4600	5700	6600	7000
Approx. Weight, mounted	4800	6600	7700	9000	9500
Price for **Fig. 1617** unmounted, on skids	$257 00	$300 00	$334 00	$378 00	$387 00
Price **Fig. 1617** mounted as shown	320 00	375 00	420 00	472 00	48500

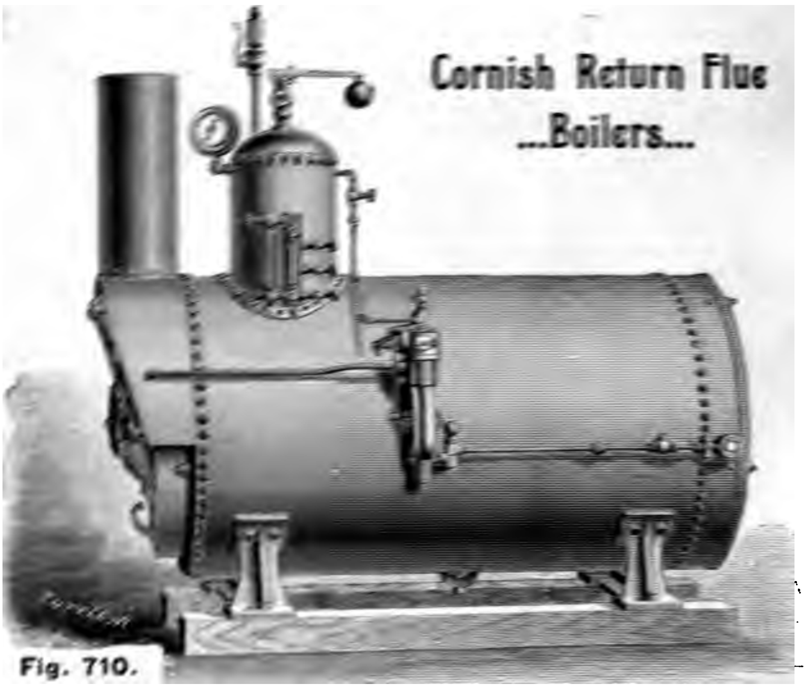


Fig. 710.

Fig. 710 illustrates our **Cornish Return Flue Boiler** on skids. The b has return flues as illustrated in Fig 711, securing great economy of fuel. fire box is circular in form, entirely surrounded by water, and permits bur coal or 4 ft. wood. The circular form makes boiler stronger than other boil The back end cover is lined with fire-proof covering to retain the heat. boiler is provided with an extra heavy pipe heater passing through the back of smoke space, and the water being fed through, is heated before entering boiler. Heater is provided with plugs for cleaning. The fire front is venient for easy access to flues, and the ash door can be set for any desired d

These boilers are made of 60,000 T. S. shell steel, and heads are of fla steel. Everything about these boilers is first-class and made to wear.

See prices under Fig. 1632.

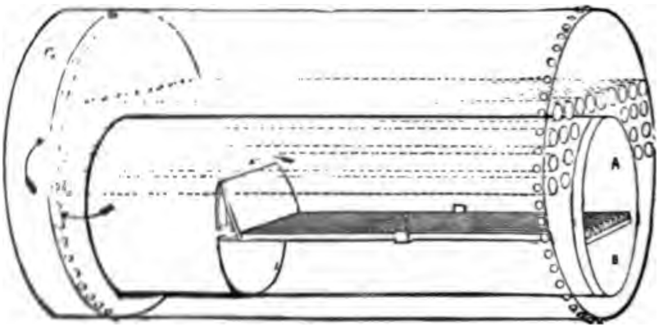
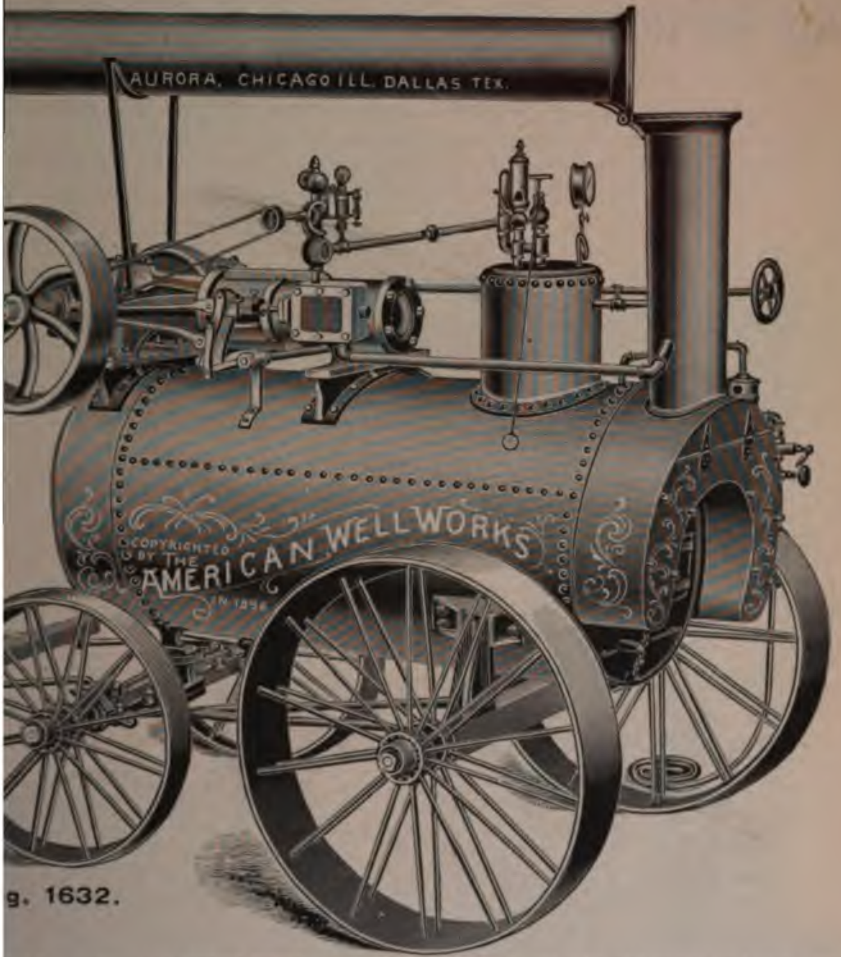


Fig. 711.

Fig. 711 shows the interior construction of **Figs. 710** and **1632**, and the p smoke from the fire back and returning through flues to the stack.

UNTED CORNISH BOILERS WITH AND WITHOUT ENGINE.



g. 1632.

632 illustrates our **Cornish Boiler,** mounted on steel wheels and axles with engine on boiler. The described in description of **Fig. 710**, which see.

s Figs. 710 and 1632 Boilers, Improved.

nclude: **Safety Valve, Steam Guage, Water Gauge, Gauge Cocks, Water Columns and Fittings, Feed Pump low-off, Poker, Scraper and Ash Hoe.**

Length over all, In.	Length Flues, In.	No. 3 In. Flues.	Length Stack, Ft.	Diam. Stack, In.	Number Grate Bars.	Lg'th Grate Bars for Wood, In.	Lg'th Grate Bars for Coal, In.	Horse Power Engine.	Diam. Steam Cyl., In.	Length Stroke, In.	Price **Fig. 710** Boiler and Trimmings only.	Price **Fig. 710** Boiler with Single Motion mounted on back.	Price **Fig. 1632** Mounted Boiler and Trimmings only.	Price **Fig. 1632** Mounted Boiler with single motion E'gine	Price for Reversible Engine to add to corresponding lists.
74	54	16	10	11	6	54	36	6	6	6	$275.	$410.	$340.	$475.	$15.
86	66	16	10	11	6	54	36	8	6	8	325.	485.	395.	555.	18.
88	60	27	10	12	8	54	36	10	7	9	380.	560.	455.	635.	22.
100	72	27	12	12	8	54	36	12	8	12	440.	685.	520.	765.	25.
112	84	27	16	12	8	54	36	15	9	12	475.	735.	565.	825.	30.
112	84	39	16	16	11	54	36	20	10	12	500.	780.	600.	880.	36.
124	96	39	16	16	11	54	36	20	10	12	550.	830.	670.	950.	38.
156	120	39	25	18	11	54	40	....	....	....	625.	......	765.	......	...
228	192	39	25	18	11	54	40	....	....	....	750.	......	910.	......	....

Our Vertical Traction and Drilling Engine.

Has submerged flue boiler, duplex steam pump for JETTING and REVOLVING, and reversible double engines set quartering, which never stop on center.

Runs on road with or without team, draws your machine, can be fitted with either belt pulley or sprocket wheel, or both, and if fitted with spool repairs wells without well machine being moved to the well.

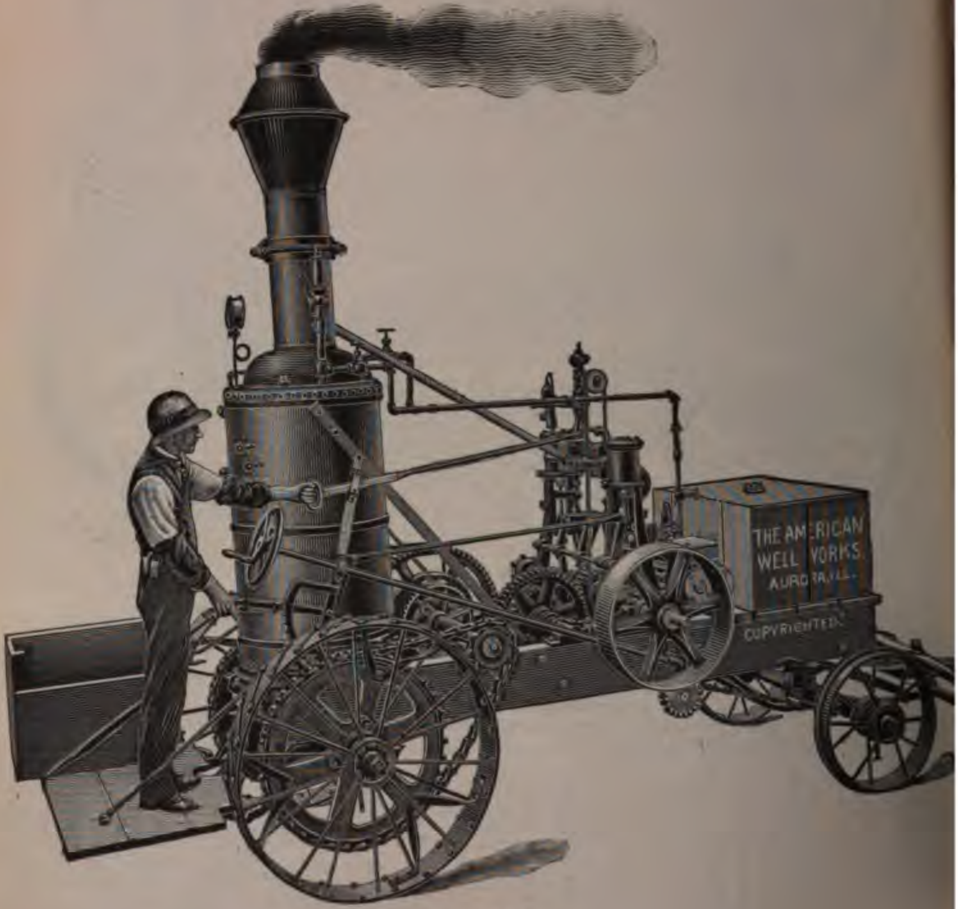


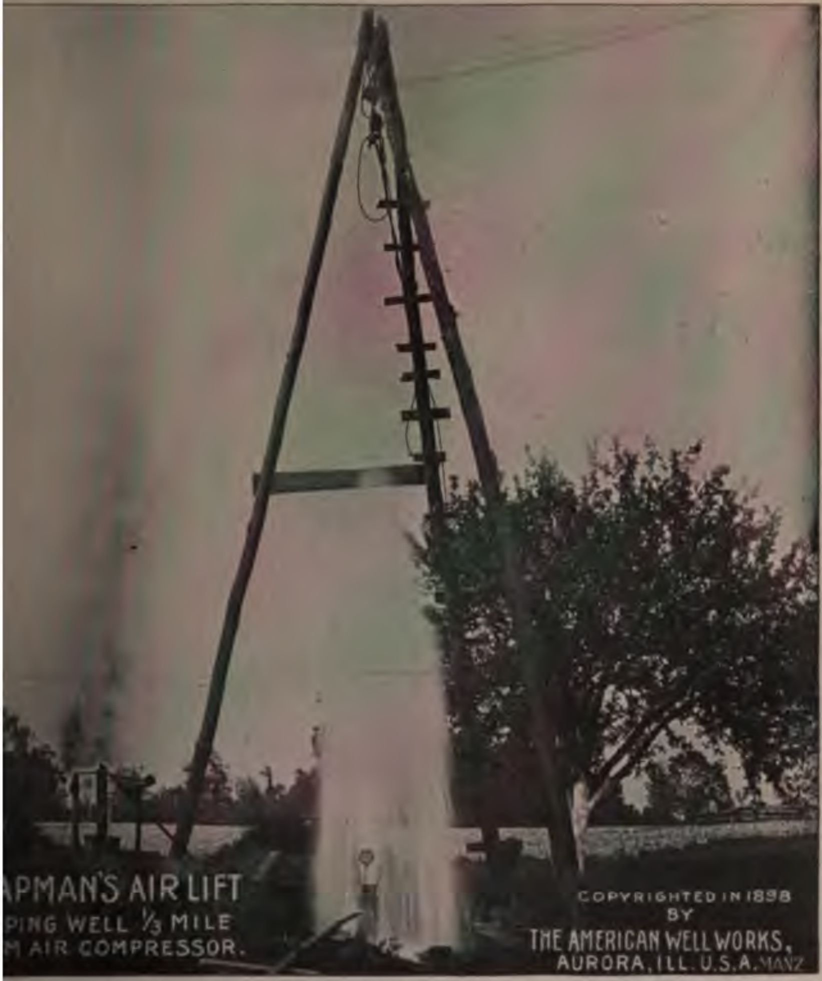
FIG. 1566.

Made in three sizes:

No. 1.	**10 H. P.**	**Boiler,**	**8 H. P.**	**double Engine as shown**	**$ 850.**
" 2.	**12 H. P.**	**"**	**10 H. P.**	**" " "**	**1100.**
" 3.	**15 H. P.**	**"**	**12 H. P.**	**" " "**	**1600.**

[SEE OTHER PAGES FOR DRILLING MACHINES AND TOOLS FOR USE WITH THIS ENGINE.]

Water Lift Department.



PMAN'S PATENT AIR WATER LIFT FOR PUMPING DEEP WELLS.

Artificial Flow of Water from an Artesian Well after Air was Applied.

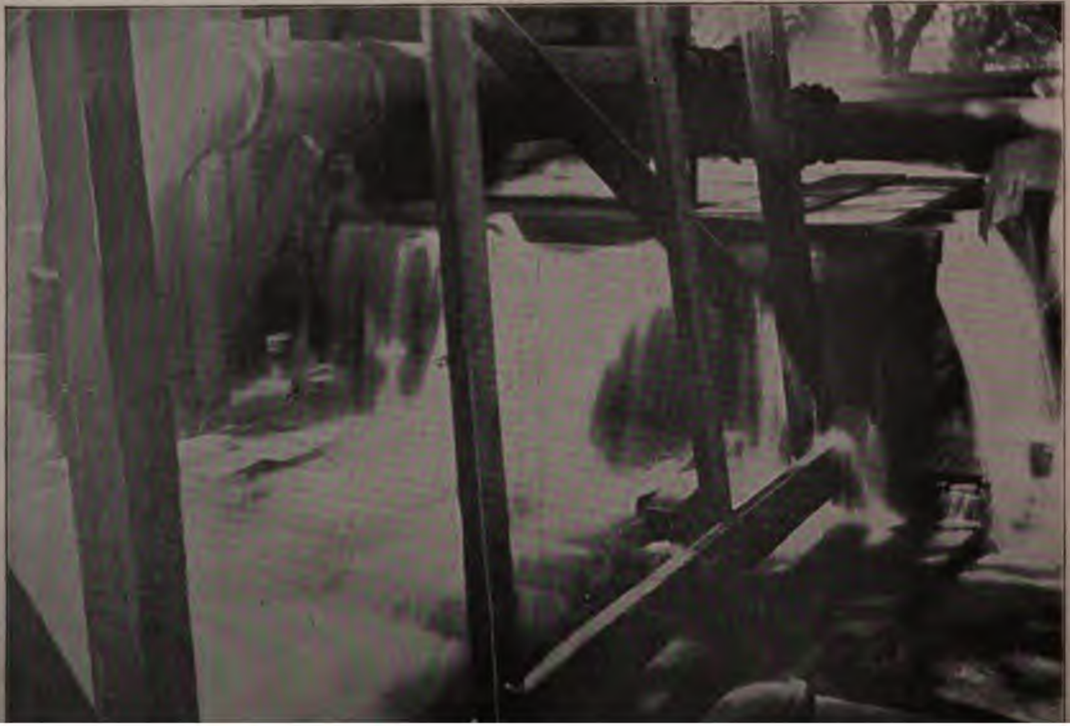


Fig. 1688 shows artificial the flow of water from the **Bell Water Co's.**, artesian well at **Waco, Tex.**, by the use of our air compressor Fig. 1627 after applying our Chapman Patent Air Water Lifting System. Natural flow was 290 gallons; artificial discharge is 679 gallons; increased supply, 389 gallons per minute. 100,000 gallons per day more than we guaranteed. A bountiful supply of pure artesian water is one of the greatest blessings to mankind. The great value of the application of air for increasing the water supply and removing obnoxious gases, will be appreciated by those in need of good, wholesome, health giving water. Air is mixed with the water by this system, and when they separate, the gas is removed, leaving the water more potable than if raised by other means. It fol-

Chapman's Patent Air Lift Systems.

This picture is used to illustrate in a general way, how water is lifted from artesian wells by ree Air Ejector System, or from open wells, rivers, etc., by our Automatic In-take, (which is an air pump), or from springs, lakes or rivers, and conveyed to railway tanks, for city water ies, irrigating, etc., operated by compressed air miles from the engine economically.

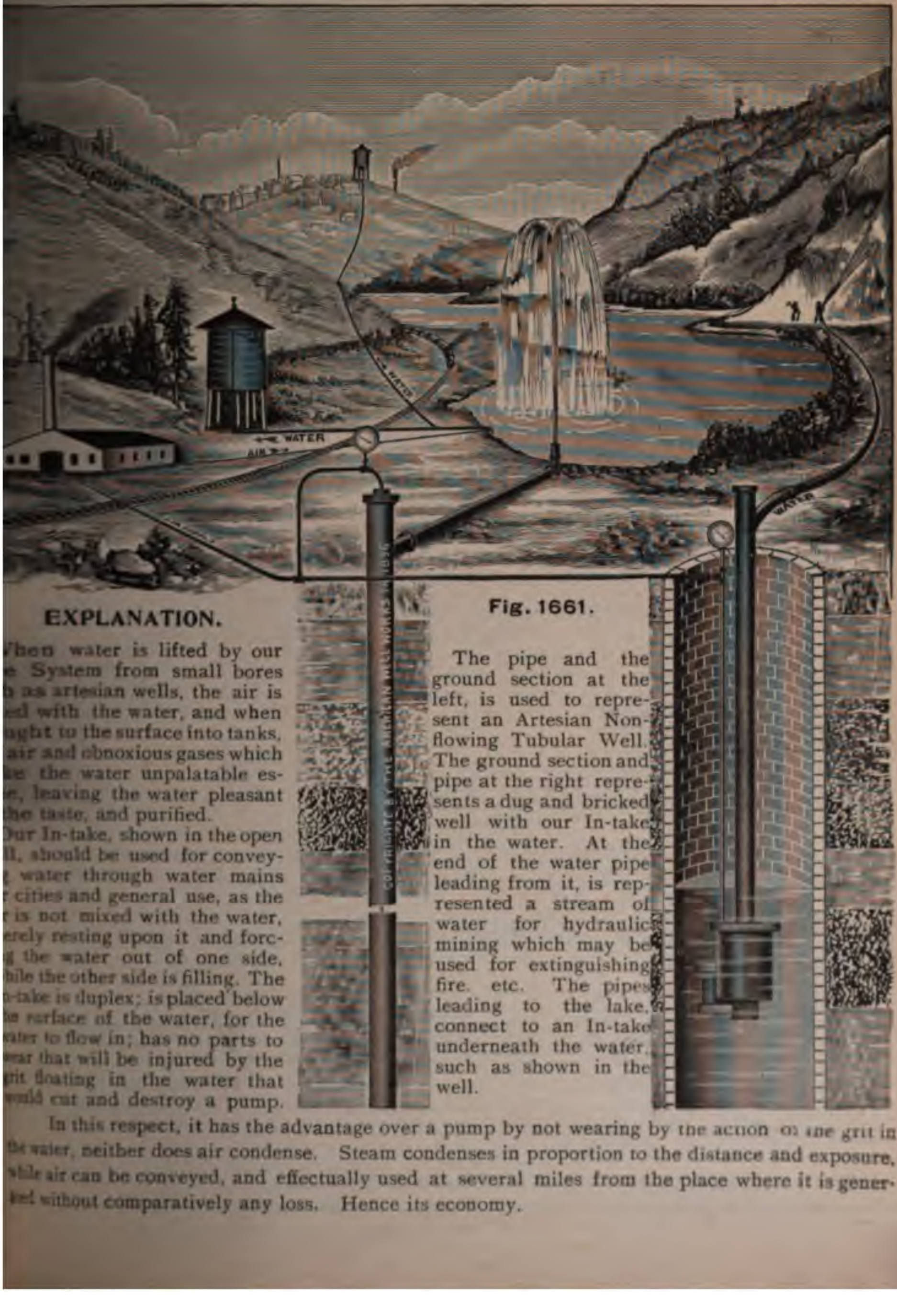

WATER
AIR
WATER
WATER
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Fig. 1661.

The pipe and the ground section at the left, is used to represent an Artesian Non-flowing Tubular Well. The ground section and pipe at the right represents a dug and bricked well with our In-take in the water. At the end of the water pipe leading from it, is represented a stream of water for hydraulic mining which may be used for extinguishing fire, etc. The pipes leading to the lake, connect to an In-take underneath the water, such as shown in the well.

EXPLANATION.

hen water is lifted by our e System from small bores h as artesian wells, the air is ed with the water, and when ught to the surface into tanks, air and obnoxious gases which ke the water unpalatable es-e, leaving the water pleasant he taste, and purified.

ur In-take, shown in the open ll, should be used for convey- water through water mains cities and general use, as the is not mixed with the water, erely resting upon it and forc- the water out of one side, hile the other side is filling. The -take is duplex; is placed below e surface of the water, for the ater to flow in; has no parts to ear that will be injured by the rit floating in the water that ould cut and destroy a pump.

In this respect, it has the advantage over a pump by not wearing by the action of the grit in the water, neither does air condense. Steam condenses in proportion to the distance and exposure, hile air can be conveyed, and effectually used at several miles from the place where it is gener- ed without comparatively any loss. Hence its economy.

Horizontal Belt Driven Air Compressor.

Fig. 1591 illustrates our Double Acting Belted Air Compressor for work not requiring the capacity of Fig. 1707 belted compressor. It may be used both as a horizontal or vertical compressor as desired. It compresses to 100 lbs. pressure, and is used for working pressures of 30 to 60 lbs. The cylinder is surrounded by a water jacket for cooling, the crank is steel, inlet valves are of steel forged in one piece and seat on bronze seats, balance wheels are cast heavy and turned true, cylinder has sight feed lubricator, and bearings requiring it, have grease cups.

If desired, it may be mounted on a truck with gasoline engine or other power and moved from well to well on large ranches for pumping water, the pipes being already in the wells so that to start pumping, it is necessary only to connect the air pipe.

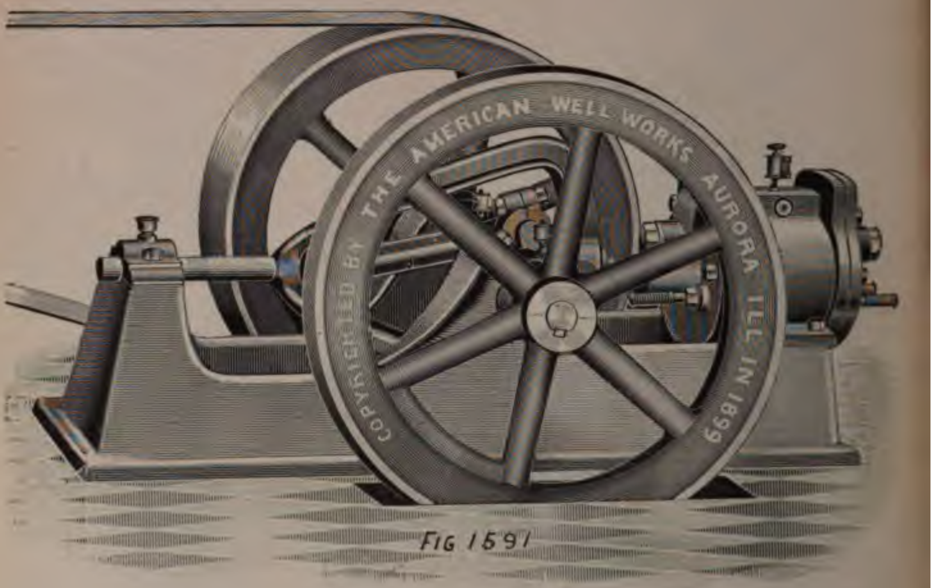
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FIG 1591

It is suitable for Chapman's patent air water lift system or other purposes requiring air pressures listed.

An automatic attachment for stopping the compressor at a determined pressure will be furnished with this compressor at an additional price if desired.

PRICES FIG. 1591 BELT DRIVEN AIR COMPRESSOR.

Diam. Cyl. Inches.	Length Stroke Inches.	Pulley,*		Floor Space, Ft.	Temporary Pressure Limit Lbs.	Working Pressure Lbs.	R. P. M.† Limit at Highest Working Pressure.	Cu. Ft. Free Air at Speed Listed.	Gallons Free Air at Speed Listed.	Aps. Weights Lbs.	Code.	Price
		Diam., In.	Face, In.									
4	6	28	4¼	2¼ x 4¾	100	30 to 60	180	15	117	725	Caxo	$120
5	6	28	5¼	2½ x 4¾	100	30 " 60	180	24	184	900	Caxto	150

If tight and loose pulley is desired add to net price* **10 per cent.

†*Lower speeds increase life of plant and are advised where practicable for economy.*

/ertical Belt Driven Air Compressor.

. 1707 is made from a photograph of one of our vertical belt driven double-acting single ssion air compressors. It occupies small space, is strongly built, has bronze discharge valves t valve seats, has air inlet valves and stems of steel in one piece, and has crank shaft of forged Balance wheels are turned true, and one has wide face for driving belt. Air cylinder is pro- ith water jacket for cooling during compression, and with sight feed lubricator. All bearings vided with take-ups, and are fitted with oilers to permit constant running.

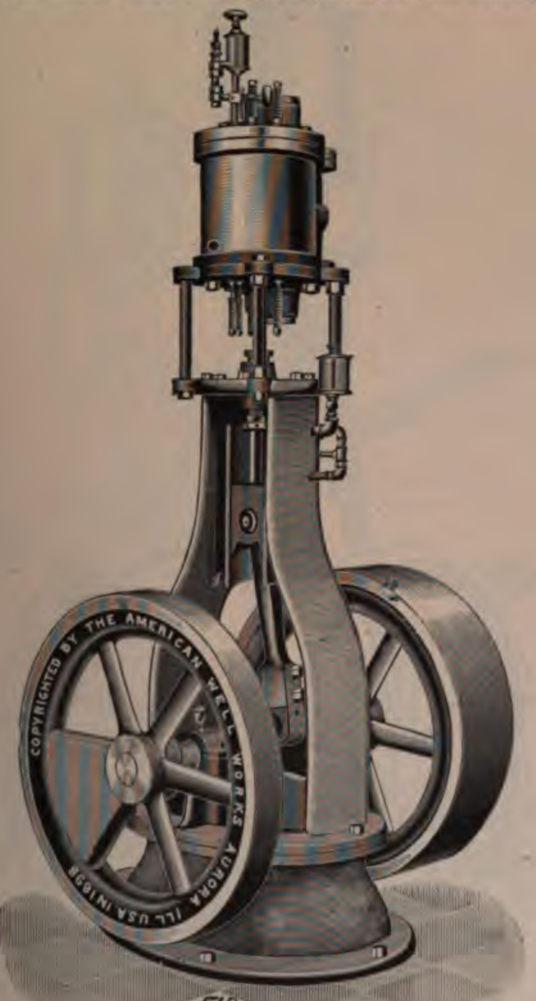
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FIG. 1707

his air compressor is especially adapted for Chapman's Patent Air Water Lift System but may d for any purpose requiring a temporary air pressure to 120 lbs. per square inch and a constant g pressure to 75 lbs. For higher working pressure use our double compression compressors. can be practically driven where economical power can be obtained from a line shaft, gasoline m engine, electric motor, water wheel or other appliance.

'e build this compressor in eight standard sizes. Can fit them when so ordered at small addi- cost with:—Tight and loose driving pulley, or a friction clutch pulley, for stopping and starting.
Automatic pressure stopper and starter.
Automatic fixed pressure maintainer.

ices:—State requirements, and if for Chapman's Patent Air Water Lift System answer ques- *another page or write* for sheet of information required. We will quote on receipt of data.

Vertical Belt Driven Air Compressor.

Fig. 19 illustrates our heavy vertical belt double-acting single compression air compressor is strongly built, has bronze discharge valves and inlet valve seats, has air inlet valves and ste steel in one piece, and crank shaft of forged steel. Balance wheels are turned true, and one has face for belt. Air cylinder has water jacket for cooling during compression, and sigh lubricator. All bearings are provided with take-ups, and with oilers to permit co running.

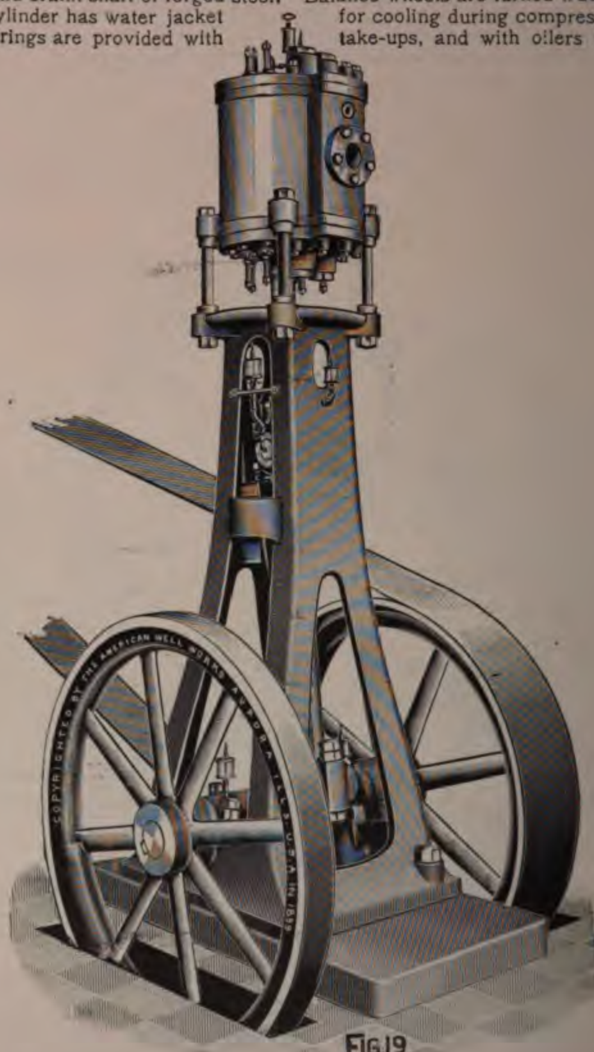
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FIG. 19

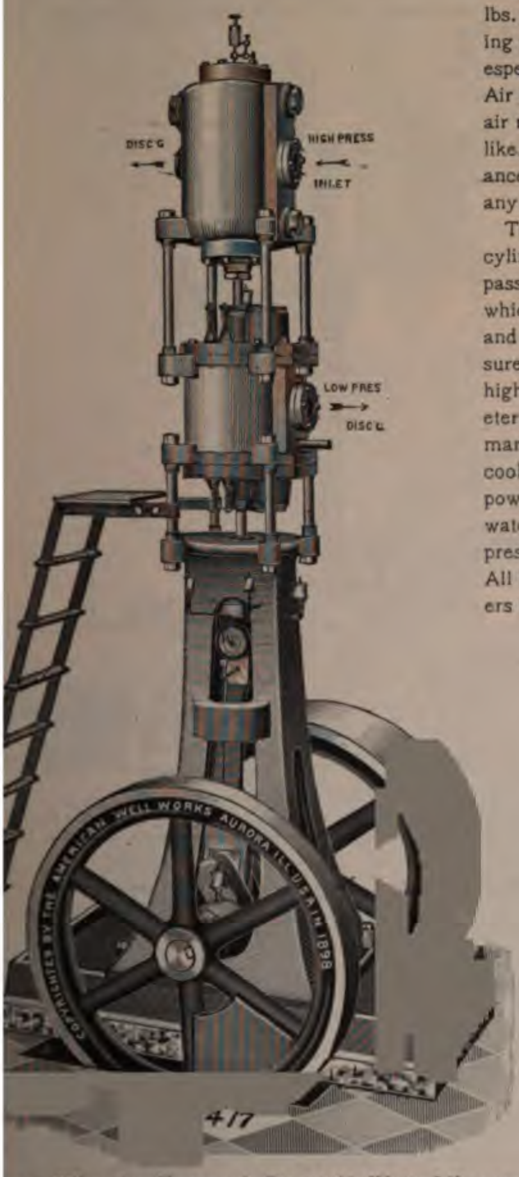
This compressor is adapted for Chapman's Patent Air Water Lift System or any purpose ing temporary air pressure to 120 lbs. per square inch and working pressure to 75 lbs. It driven with any economical power. We fit it at small additional cost with:—friction clutch pu stopping and starting; or automatic pressure maintainer. State requirements and if for Wa System, answer questions on another page or write for sheet of information required.

PRICES FIG. 19 SINGLE COMPRESSION BELT DRIVEN AIR COMPRESSOR.

Diam. Cyl.	Stroke.	Pulley.		Floor Space. Ft.	Height Ft.	Apx. Wts.	R. P. M. Limit.	Cu. Ft. Free Air.	Gal. Free Air.	Code.	P
		Diam	Face.								
10	12	49	8	6 x 4½	9¾	7000	150	163	1220	Caesnod	
12	12	49	10	"	"	7200	150	235	1760	Centeal	
14	12	49	10	"	"	7600	150	320	2400	Cenleat	
14	16	61	12	6¾ x 4⅔	10⅔	9500	120	341	2555	Cemmem	

uble Compression Belted Air Compressor.

417 is made from a photograph of one of our Vertical Double Acting Double Compression n Air Compressors especially suitable for locations permitting small floor space.


DISC'G
HIGH PRESS
INLET
LOW PRES
DISC'G
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417

It is practical for any use requiring a temporary air pressure not exceeding 200 lbs. per square inch and a constant working pressure of from 75 to 160 lbs. It is especially adapted for Chapman's Patent Air Water Lift System, for railroad uses, air rock drills, shop air tools, and the like. It is driven by a belt on the balance wheel pulley receiving power from any convenient source.

This style compresses air in lower cylinder to a low pressure. The air then passes through an ample intercooler, which is provided, wherein it is cooled, and then passed into upper or high pressure cylinder for final compression. The high pressure cylinder is of smaller diameter than low pressure cylinder, and a marked saving of power results. The cooling in intercooler also save much power. Both air cylinders have cooling water jackets for cooling during compressions and have sight feed lubricators. All bearings are fitted with sight feed oilers to oil without stopping.

We finish this style neatly and with finished brass trimmings. If ordered, they will be highly finished and trimmings nickeled at small additional price.

We build this style in five sizes single, and five sizes duplexed. We will fit this style at small additional cost with:

Friction clutch balance wheel pulley, for stopping and starting, independent of other machinery.

Automatic pressure stopper and starter.

Automatic fixed pressnre maintainer.

es:—When for Chapman's Patent Air Water Lift, answer questions on another page, or send ll out question sheet. When for other uses, state work and conditions and we will quote sized machine for the work which you describe.

Gasoline Engine Driven Air Compressor.

Fig. 125 illustrates our Gasoline Engine Driven, Double Acting Single Compression Air Compressor for compressing air to working pressures 30 to 75 lbs., and temporary pressure to 100 lb The air cylinders are the same as used in our 120 lb. compressors for temporary pressure. Th engine is our well known Fig. 1703 gasoline engine modified by attaching compressor, and which i thoroughly reliable in every respect; for further description, see our gasoline engine descriptio Air compressor is attached with machine cut gears, which run smoothly. The air cylinder is wat jacketed for cooling during compression. Air valves are our well known poppet valves. Inlet poppe are turned from one piece of steel and seat on bronze seats. This compressor may be used for Air Power Plants in shops, and is especially adapted for pumping deep wells with Chapman's Air Water Lift System.

We furnish ample sized engine for doing the work easily.

We furnish special air plants for any duties.

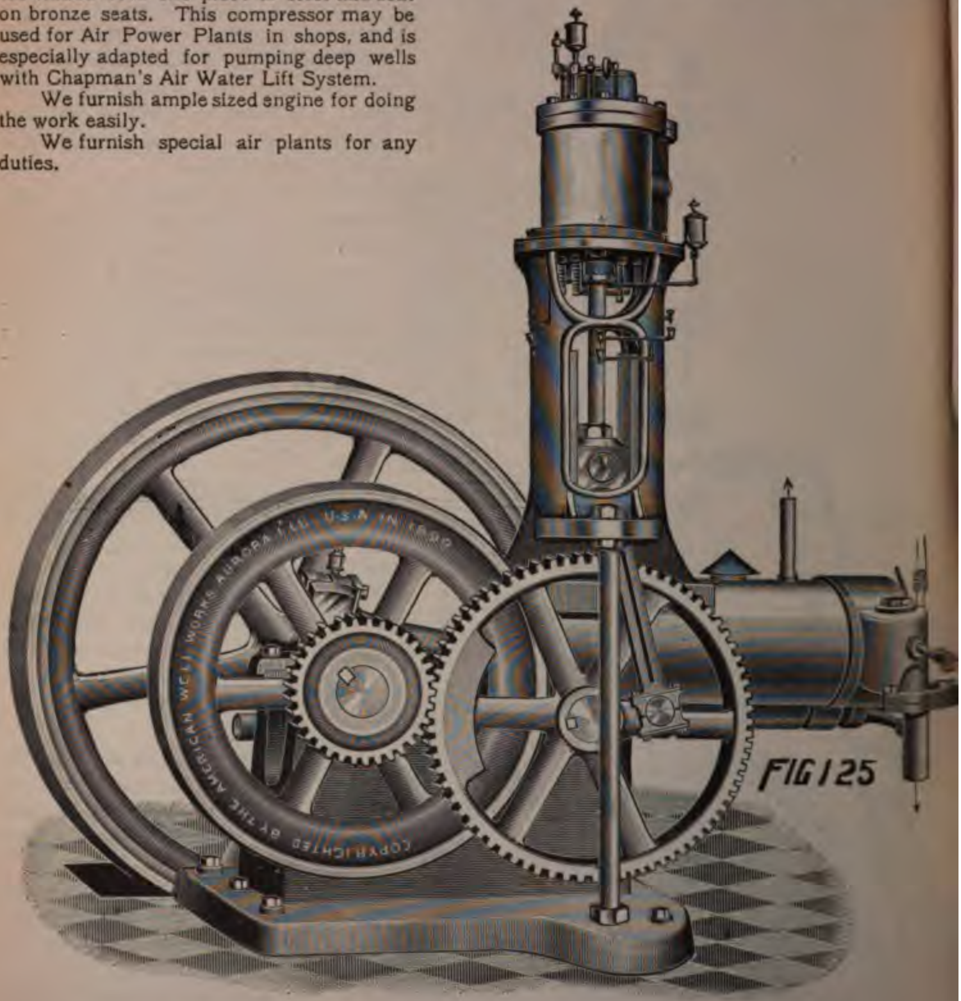
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FIG 125

DIMENSIONS AND DATA OF FIG. 125 AIR COMPRESSOR.

No.	Diam. Air Cyl.	Stroke.	H. P. Engine.	Floor Space, Ft.	R. P. M. Compressor.	Cu. Ft. free air per Min.	Apx. Wts.	Code.
1	6	8	8	7½ x 4	150	40	3700	Coky
2	7	8	10	8 x 4	150	53	4300	Clot
3	8½	9	12	9½ x 4½	130	76	5500	Coux

rtical Steam Driven Air Compressor.

555 is made from a photograph of one of our steam driven double acting air compressors. This
compact and occupies small floor space in pump or engine room.

rong and durable, has bronze discharge valves, steel inlet air valves and stems forged together in
and seating on bronze removable seats, forged steel crank of extra size and balance wheels turned
parts subject to wear are provided with take-ups. All bearings are provided with oilers to run with-
ng, and cylinders have sight feed lubricators.
r cylinder has ample water jacket for cooling during compression and steam cylinder is neatly

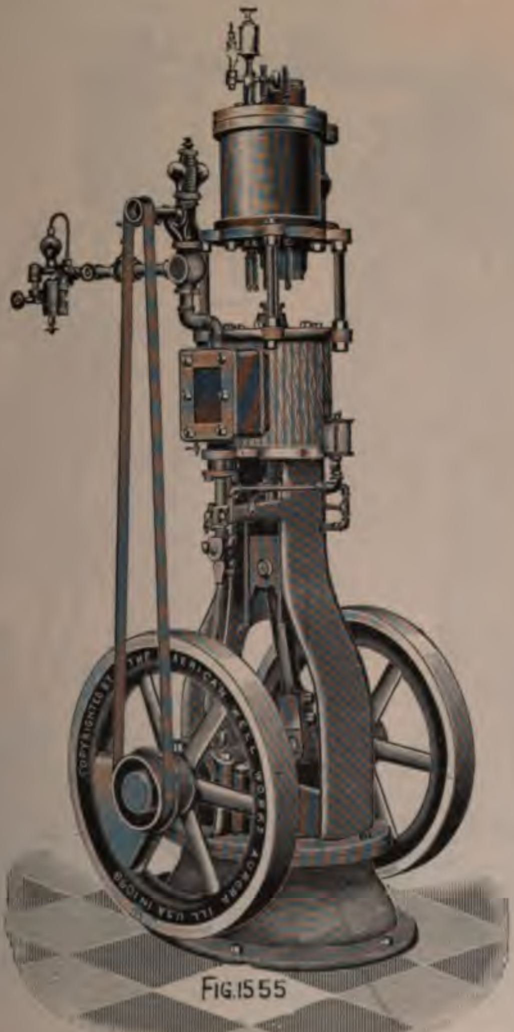
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FIG.1555

air compressors compress economically, are especially designed for operating Chapman's Patent Air
t System, and are equally serviceable for shop air tool use or any purpose for which air pressure of
er square inch is desired temporarily or 75 lbs. under constant working pressure.

are large numbers of them in use and their special fitness for the service required is constantly in
he large demand for them.

:—We build this style in eleven sizes and on receipt of information as to requirements will quote net

desired for Chapman's Patent Air Water Lift, answer questions in regard to well or wells on another
nnection herewith, or send for question sheet of information we need to properly quote you.

Vertical Duplex Steam Driven Air Compressor.

Fig. 1708 is made from a photograph of one of our Vertical Duplex Steam Driven Double Acting Single Compression Air Compressors.

This style occupies smaller floor space than a horizontal and is an ornament in an engine room. Crank shaft is of forged steel, of extra size. Steam cylinders are neatly jacketed. Steam valves are our adjustable cut-off valves which especially adapt this compressor to Chapman's Patent Air Water Lift System for the reason that steam cut-off may be adjusted to the exact load found in each particular case, securing the highest economy by using no more steam than required for the lift.

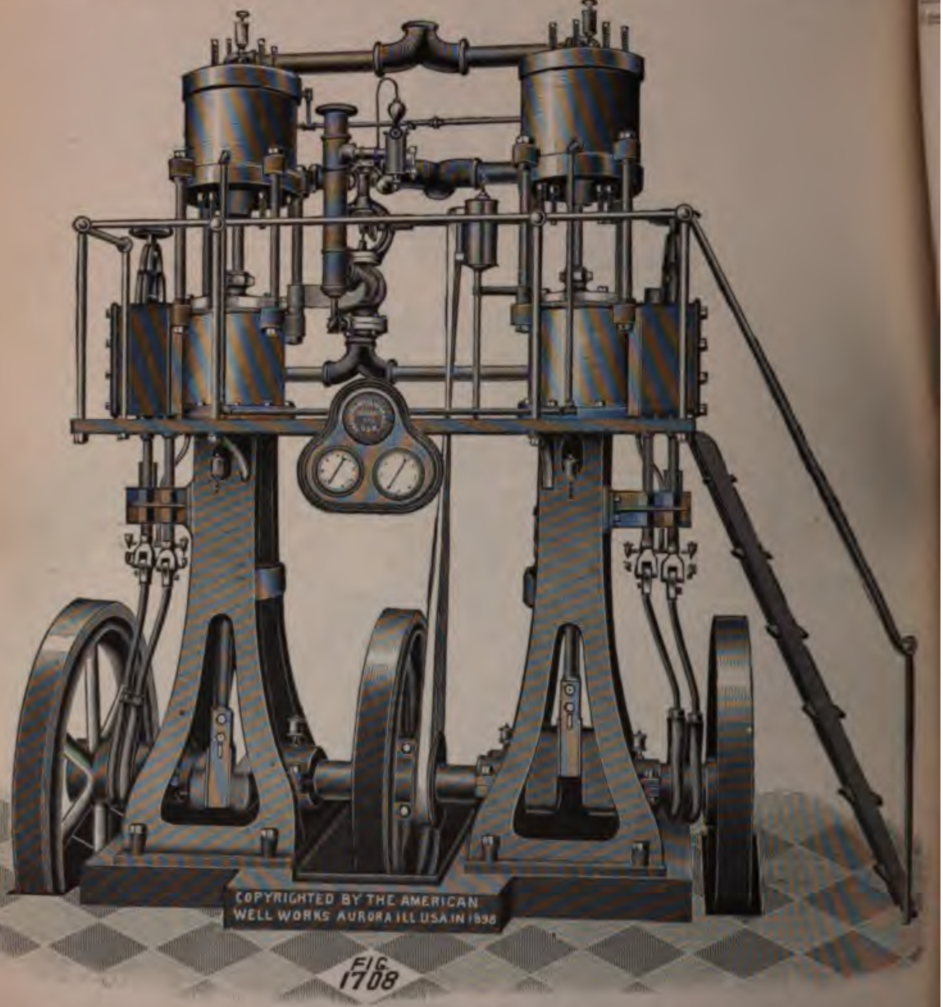
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FIG. 1708

Air cylinders are water jacketed to cool them while working. Air inlet valves with stems are forged in one piece and seat on removable bronze seats. Outlet air valves are bronze, with removable seats.

Compressor is provided with our patent air governor that controls speed and air pressure, and will stop it in case of sudden extreme change of air pressure. Belt driven governor is not furnished unless ordered. We furnish steam and air pressure gauges, and frame.

We fit this style with oilers to run constantly. We finish them neatly with brass trimmings; or, if ordered, with high finish and nickel plated trimmings at additional price.

Prices:—We build this compressor in combination of four sizes, and will submit estimate on receipt *of data as to requirements.*

Balanced Single Compression Air Compressor.

Fig. 1544 illustrates our Balanced Steam Valve, Steam Driven, Single Compression Air Compressor, for delivering a working air pressure of 30 to 75 lbs., and temporary pressures to 120 lbs. It is suitable for any purpose requiring these air pressures, and is especially adapted for Chapman's air water lift system for pumping deep wells.

Steam valve is our balanced piston, which works easily. It has our air pressure steam governor (speed governor substituted if desired) which controls machine and shuts it down if excessive pressure or great loss of pressure, avoiding accident. Combined speed and air pressure governor will be furnished if desired at slight additional cost. Steam cylinder is asbestos covered and neatly jacketed. Balance wheels are turned true. Cross-head and center swivel with take-up for wear are of steel. Air cylinder is completely water jacketed, sides and covers. Air valves are our well known let and discharge valves which cannot be drawn into cylinder. Inlet poppets are turned from one iece of steel, and seat on bronze seats. Free air inlet duct connection for obtaining cool air from utside of warm engine room is provided, thus increasing capacity and saving power. Piston heads re shrunk on piston rods and riveted, obviating all difficulty of loose piston heads. All bearings are rovided with take-ups, and complete trimmings are furnished.

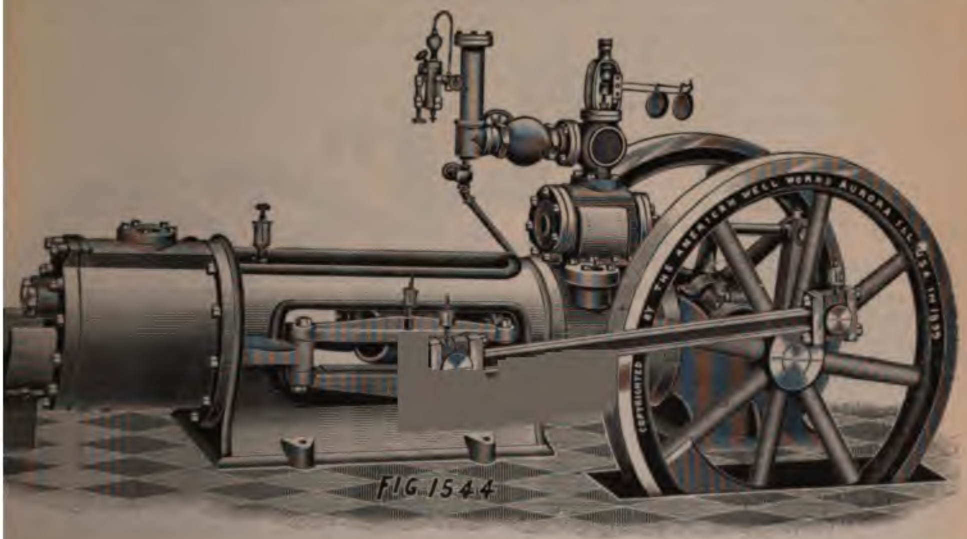

FIG. 1544

Prices:—We make prices on complete Air Water Lift and Air Power Plants, and sell compressors eparate if so desired.

DIMENSIONS AND DATA OF FIG. 1544 COMPRESSOR.

No.	Diam. Cyls. In.		Stroke.	Floor Space, Ft.	Rev. per Min.	Cu. Ft. free air, per min.	Apx. Wts.	Code.
	Steam.	Air.						
1	7	8	12	10 x 3¼	50 to 140	97	5000	Ceta
2	8	8	12	" "	" "	97	5300	Cesa
3	8	10	12	" "	" "	152	6000	Cere
4	10	8	12	" "	" "	97	5400	Cenz
5	10	10	12	" "	" "	152	6200	Cemo
6	10	12	12	" "	" "	219	6900	Cela
7	12	10	12	" "	" "	152	6800	Cehe
8	12	12	12	" "	" "	219	7200	Cedo
9	12	14	16	12 x 4	50 to 120	344	9200	Ceft
10	14	14	16	" "	" "	344	9600	Ceik
11	16*	14	16	" "	" "	344	10200	Cebu
12	16*	16	20	13¼ x 4¼	50 to 100	464	13200	Ceut

*Are cast double, making dead air jacket, preventing condensation.

Adjustable Steam Cut-Off Air Compress

Fig. 1623 illustrates our Adjdstable Cut-Off Steam Valve Steam Driven Single Compressio Compressors, for delivering a working air pressure of from 30 to 75 lbs., and a temporary pressu 120 lbs. This compressor is suitable for any purpose requiring pressures stated, and is espe designed for Chapman's Air Water Lift System in pumping deep wells.

The adjustable cut-off steam valve permits taking steam during the greater portion of the s to put up higher initial pressure for starting wells and permits then cutting off earlier with lower ing pressure to secure economy in steam consumption. This makes it possible to at all times steam expansion to the actual various work encountered in deep well pumping, taking steam throttle wide open until cut-off takes place. Side rods are forged steel. Crosshead and center nut with perfect take up, are steel. Air inlet poppets are turned from one piece of steel, and se bronze removable seats. Discharge valves are of bronze. Free air hoods for obtaining ai

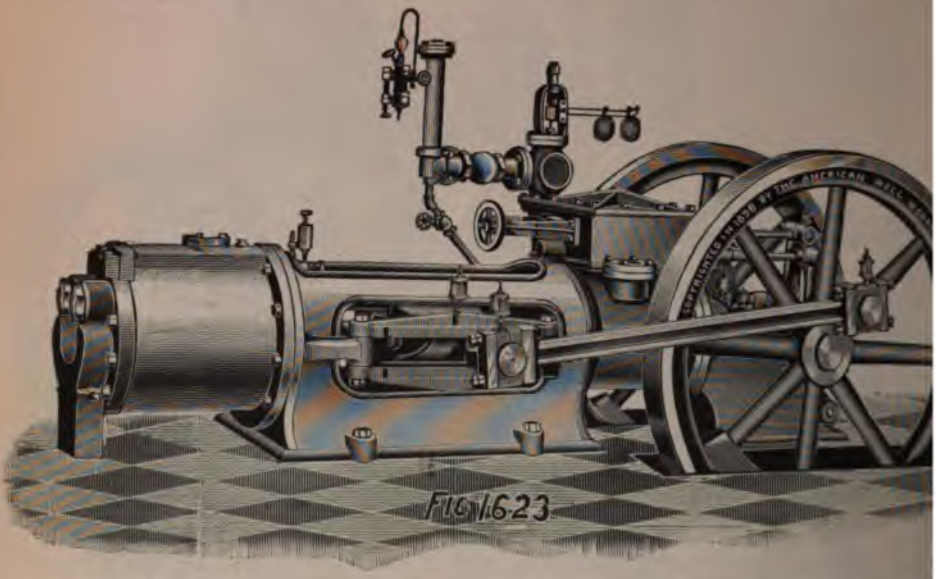
FIG. 1623

ply outside of warm engine room are provided. Air pressure steam governor furnished, ma constant pressure, and in case of sudden excessive pressure, or great loss of pressure, will shut machine, avoiding accident. Balance wheels are heavy and turned true, and they with wrist p pressed to place by hydraulic pressure. Wrist pins are of extra size, and air cylinders are jacketed, sides and covers, making a most economical and thoroughly built machine.

Prices.—We price complete Air Water Lift, Air Power Plants or Compressors separat desired.

DIMENSIONS AND DATA FIG. 1623 AIR COMPRESSORS.

No.	Diam. Cyls. In.		Stroke.	Floor Space, Ft.	Rev. per Min.	Cu. Ft. free air per min.	Apx. Wts.	C
	Steam.	Air.						
1	10	8	12	10 x 3¼	75 to 140	97	6200	C
2	10	10	12	" "	" "	152	6800	C
3	12	10	12	" "	" "	152	7100	C
4	12	12	12	" "	" "	219	7500	C
5	13	10	12	" "	" "	152	8000	C
6	13	12	12	" "	" "	219	8200	C
7	12	14	16	12 4	50 to 120	342	9500	C
8	14	14	16	" "	" "	342	9900	C
9*	16	14	16	" "	" "	342	10200	C
10*	16	16	20	13¼ x 4¼	50 to 100	464	13900	C

*Nos. 9 and 10 have dead air jacketed steam cylinders as well as asbestos and steel jacket

Adjustable Steam Air Compressor.

Fig. 101 shows our Improved Balanced Adjustable Cut-Off Steam Valve Straight Line Single Compression Air Compressor, for delivering compressed air at working pressures from 30 to 75 lbs., and emporary pressures to 120 lbs.

It is suitable for any purpose requiring these pressures, and is especially adapted for Chapman's eep Well Air Water Lift System in pumping deep wells, permitting taking steam during most of troke to put up higher initial pressures for starting wells, and cutting off steam at a determined portion f its stroke, permitting the engine to be driven by expansion of steam as is done in the Corliss type.

The steam expansion is therefore determined by the air pressure required, and machine may be djusted in a moment to any required steam cut off by the balanced adjustable cut off steam valve nstead of throttling by governor. Steam cylinder is cast double for dead air jacket to prevent condensation, and is covered with asbestos and with steel jacket with bands. Air cylinder is completely water jacketed, sides and covers. Cool air ducts for securing air supply outside of warm engine room are provided. Balance wheels are heavy, turned true; they and wrist pin are forced in place by hydraulic pressure. Wrist pins are of extra size; side rods of forged steel; swiveled crosshead and center nut are steel, and center pin has perfect take up for wear. Air inlet valves of poppet type are turned from a single steel piece and seat on bronze removable seats. Discharge valves are of bronze. Sight feed lubricators and oil cups are provided. Governor is our air pressure governor which maintains constant pressure and shuts machine down in case of excessive pressure or loss of nearly all pressure. Combined speed and air pressure governor is put on at slight cost when desired.

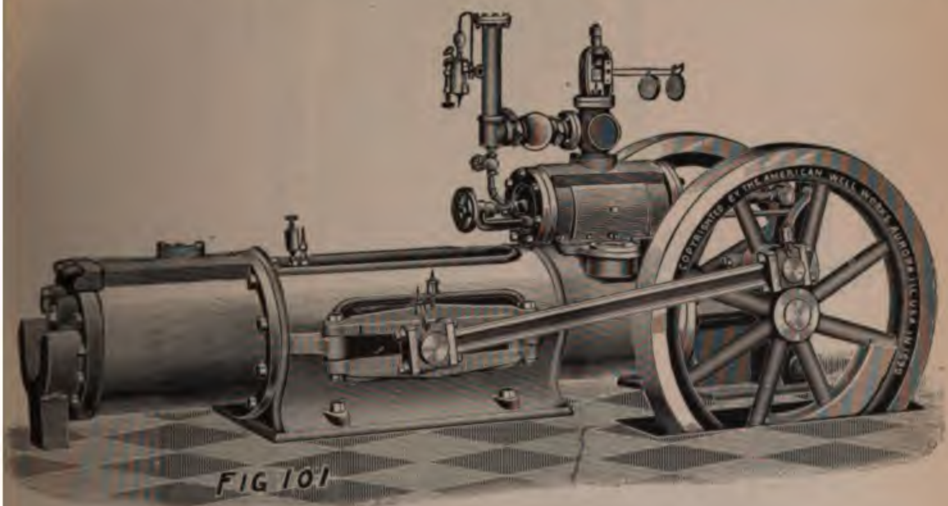
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FIG 101

Prices:—We make prices on complete air water lift or air power plants but sell compressors separately if desired.

DIMENSIONS AND DATA FOR FIG. 101 AIR COMPRESSOR.

No.	Diam. Cylinders, inches.		Stroke, inches.	Floor space. feet.	Rev. per Min.	Cu. Ft. free air per min.	Apx. weights.	Code
	Steam.	Air.						
1	16*	16	20	13¼ x 4¼	60 to 100	464	14000	Cape
2	20*	20	24	16 x 4¼	60 " 100	872	19300	Caet
3	20*	20	30	18½ x 4¼	60 " 100	1090	24500	Cito

*Are cast double *making* dead air jacket preventing condensation.

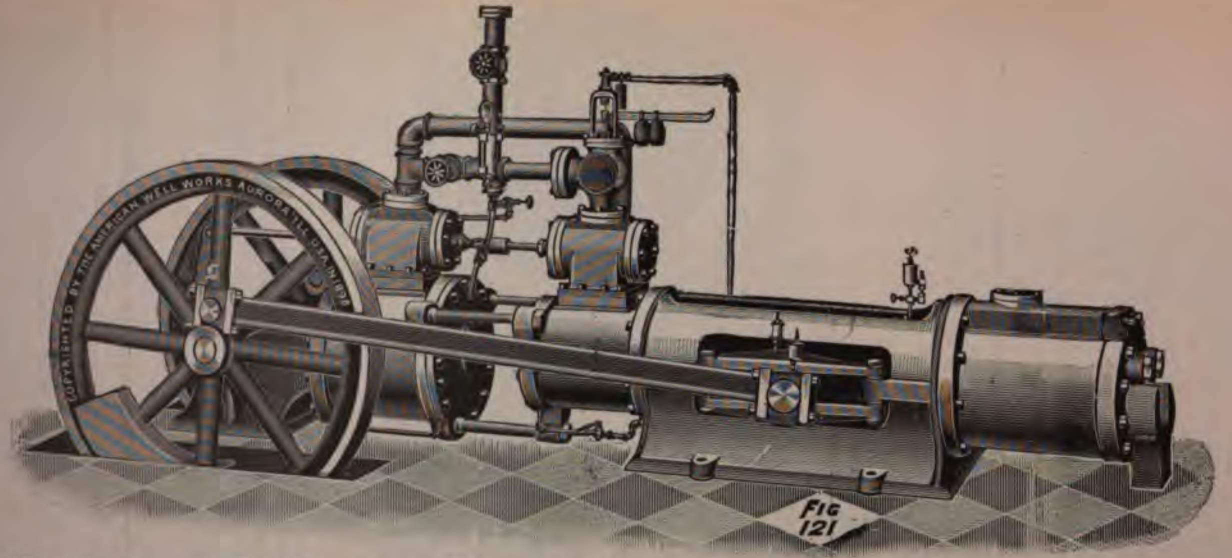
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FIG 121

Compound Steam Single Compression Air Compressor.

Fig. 121 shows our Balanced Piston Steam Valve, Double Expansion Steam, Single Compression Air Compressor, for delivering compressed air at working pressure of 30 to 75 pounds, and temporary pressures to 120 pounds. Live steam may be used in both steam cylinders for high initial pressures for starting wells pumping by Chapman Air Water Lift System, and used expansively through both cylinders under lower working pressures securing the benefits of compounding. Piston steam valves are perfectly balanced, saving power. Our air pressure steam governor (speed governor substituted if desired) which controls machine and shuts it down in case of excessive pressure or loss of much pressure, avoiding accident, is furnished. Combined speed and air, steam governor will be furnished at slight cost. Crosshead and center swivel with perfect take-up for wear are steel. Steam cylinders

Prices:—We make prices on complete Air Water Lift and Air Power Plants, and sell compressors separately.

No.	Diam. Cylinders, In		Str. In.	Floor space, feet.	Rev. per minute.	Cu. Ft. free air per minute.	Apx. Wts.	Code.
	Steam.	Air.						
1	12 & 16	14	16	15½ x 4	50 to 120	342	11500	Ciol

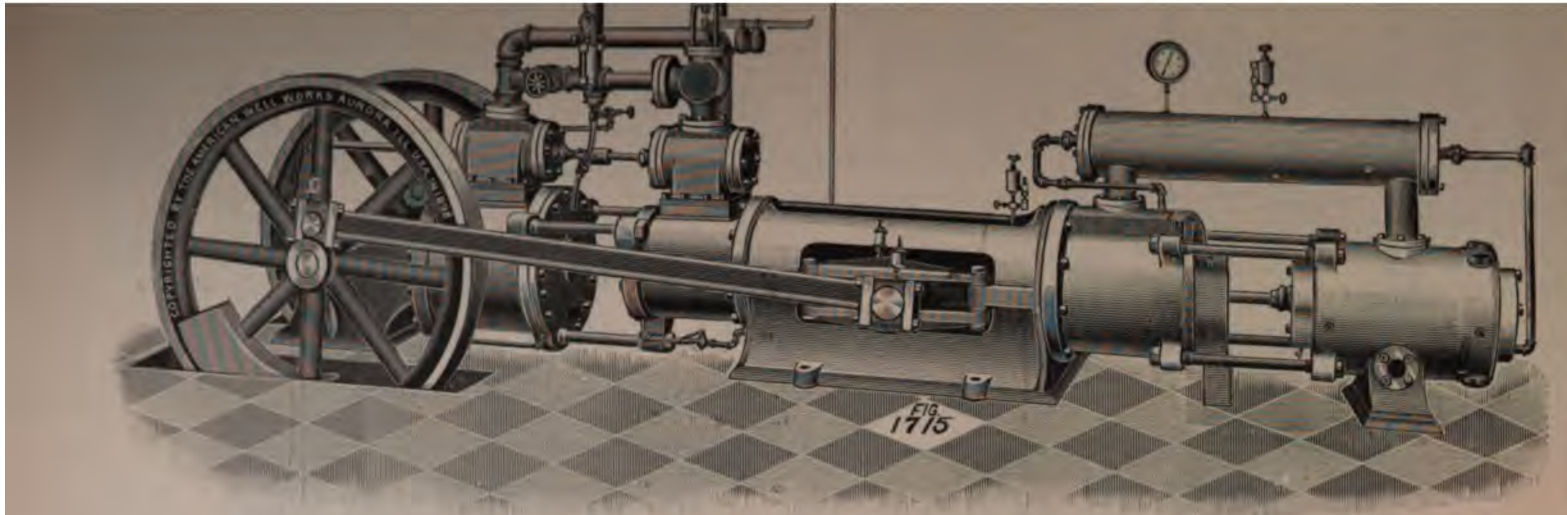
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FIG. 1715

Compound Air and Steam Air Compressor.

Fig. 1715, made from a photograph, represents one of our Straight Line Compound Steam, Tandem Double Compression Air Compressors.

They are adapted for Chapman's Patent Air Water Lift System, for railroads, quarrying, tunnelling, conveying water and other uses.

This class is especially designed to economize in steam consumption, will compress air to 200 lbs. per square inch and will maintain a working pressure of from 75 to 160 lbs. We build this machine for higher air pressure special to order. We combine both steam and air cylinders of sizes in each machine to most economically harmonize steam to the air pressure you desire.

Low pressure steam cylinder has a steam jacket preventing condensation. Steam valves are our patent balanced piston valve. Live steam may be admitted to low pressure cylinder to raise high initial pressure. The steam governor is controlled by the air pressure regulating speed to work being done. In case of sudden excessive pressure or removal of air pressure, it will stop compressor, thus preventing accident.

Air cylinders are water jacketed, and large intercooler is placed between cylinders for cooling the air before second compression, securing a marked saving in power. Low pressure air cylinder is provided with free air hoods to permit drawing air supply from outside of warm engine rooms, saving capacity and power. All air valves may be easily removed without removing cylinder covers. Cross-head is swiveled at center to facilitate operation.

Sight feed lubricators are provided for cylinders and all main bearings, and drips are piped into one. These compressors are neatly finished, or, when ordered, highly finished and trimmings nickeled, at small additional cost.

Prices:—We make this style in fourteen sizes, and are prepared to recommend the best for your work with estimate on receipt of your data.

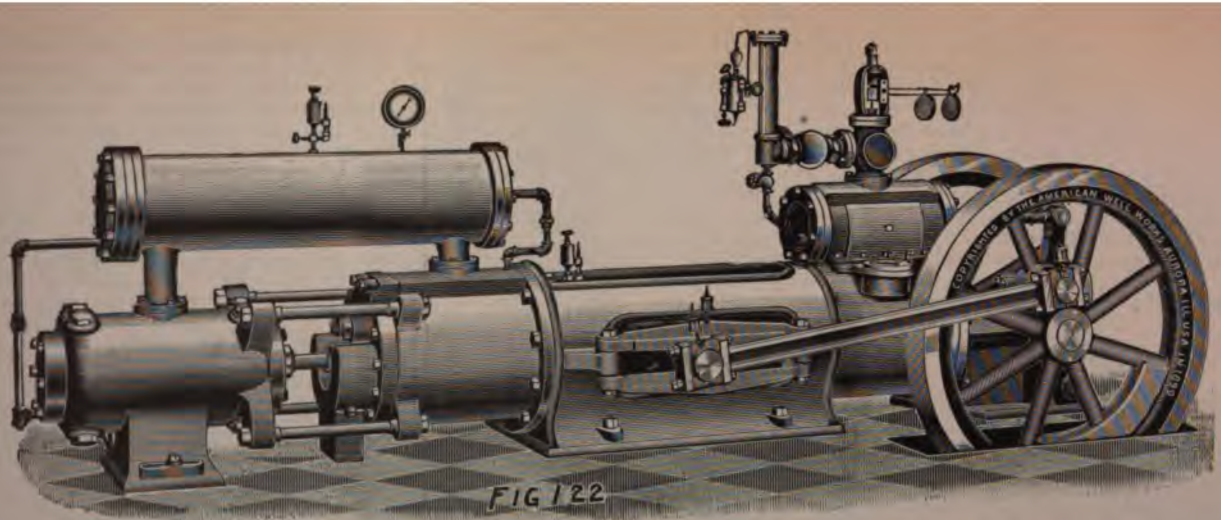
FIG 122

Balanced Piston Steam Valve Air Compressor.

Fig. 122 shows our Balanced Double Compression Air Compressor for compressing air to pressure higher than Fig. 1544. Is suitable for any purpose requiring pressures listed, and especially for Chapman's Deep Well Air Water Lift System. Steam valve is our balanced piston. Air pressure steam governor is provided (if desired, speed governor substituted) which controls machine and shuts it down if excessive pressure or great loss of pressure. Combined speed and air pressure steam governor costs extra. Steam cylinders are asbestos and steel jacketed, and Nos 13 to 15 cast double for dead air jacket, preventing condensation. Swiveled crosshead is steel. Center pin has take-up for wear. Air cylinders are completely water jacketed, have large intercooler, also air ducts to permit getting air supply outside warm engine room. Air valves are our well known poppet pattern, cannot get into cylinders, and are removable without disturbing covers. Compressing air to low pressure, cooling it, then raising to high pressure in second cylinder, reduces strains on machine over 40%, and saves power.

Prices:—We make prices on Air Water Lift or Air Power Plants, and sell compressors separately.

No.	Diam. Cylinders, In. Steam.	Air.	Str. In.	Working air Pres. for, Lbs.	Temporary air Pres. for, Lbs.	Rev. per Min.	Cu. Ft. free air per Min.	Apx. Wts.	Code.
1	8	8 & 5	12	60 to 110	150	75 to 140	97	7000	Cobu
2	10	8 " 5	12	60 " 110	150	" "	97	7300	Cocy
3	10	10 " 5	12	110 " 175	225	" "	152	7500	Coel
4	10	10 " 6	12	60 " 125	160	" "	152	7800	Cofu
5	12	10 " 6	12	60 " 125	160	" "	152	8300	Cogi
6	12	12 " 5¼	12	200 " 300	400	75 to 120	188	10000	Cohn
7	12	12 " 6	12	110 " 175	225	75 to 140	220	9000	Coip
8	12	12 " 7	12	60 " 125	160	" "	220	9200	Colm
9	12	14 " 7	16	110 " 175	225	75 to 120	342	12700	Comt
10	12	14 " 8	16	60 " 125	160	" "	342	13000	Cond
11	14	14 " 7	16	110 " 175	235	" "	342	13400	Coop
12	14	14 " 8	16	60 " 125	160	" "	342	[illegible]	[illegible]

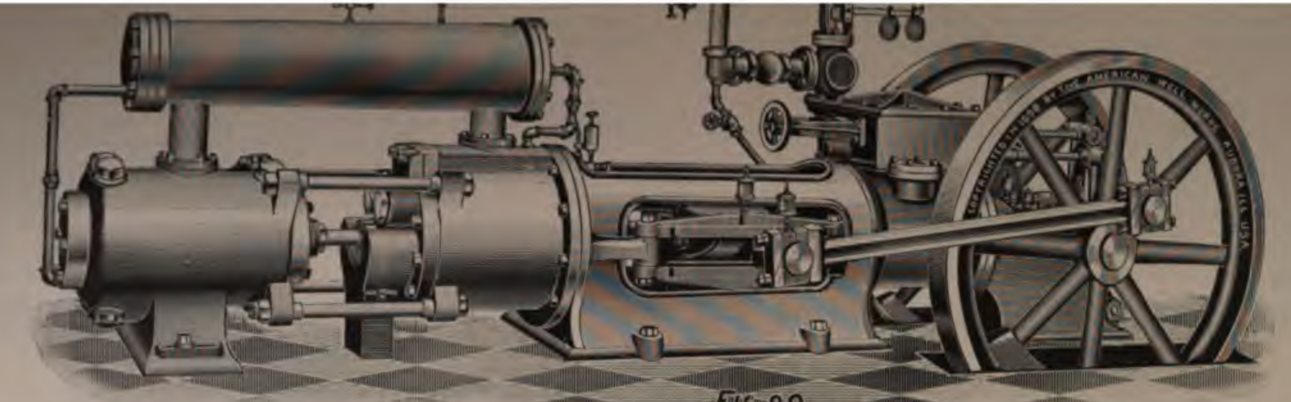

FIG 99

Adjustable Steam Cut-Off Valve Air Compressor.

Fig. 99 shows our Adjustable Double Compression Air Compressor for air pressure higher than furnished by Fig. 1623 machine. Steam valve is our adjustable cut-off by which engineer can set cut-off at point suited to work. This permits high pressure in starting wells pumping with Chapman's Air Water Lift System, and of cutting off earlier under lower working pressure, securing high economy. Steam cylinder is asbestos and steel jacketed. Air cylinders have our well known poppet inlet and discharge valves, are completely water jacketed, and are provided with intercooler. Air valves are removable without disturbing covers and cannot be drawn into cylinder. By compressing air to low pressure, cooling it and compressing it in high pressure cylinder, over 40% of strains incident to compressing in single cylinder are saved. Swiveled crosshead with take-up for wear is steel. Air pressure steam governor is provided, (if desired speed governor substituted) which controls machine, shuts it down if sudden excessive pressure or great loss of pressure, avoiding accident. **Floor space;** Nos. **1** and **2**, 13 x 3¼ ft.; **3** to **7**, 14 x 3¼ ft.; **8** to **13**, 16 x 4 ft.; **14** to **15**, 17 x 4¼ ft.

Prices.—We price complete, air plants or compressors only.

*Cast double, making dead air jacket, preventing condensation.

No.	Diam. Cyls. In.		Stroke. In.	Working air pressure for.	Temporary air Pres. for.	R. P. M.	Cu. Ft. free air, per min.	Apx. Wts.	Code.
	Stm	Air.							
1	10	10 & 5	12	110 to 175	225	75 to 140	152	7800	Cuwa
2	10	10 " 6	12	60 " 125	160	" "	152	8100	Cylm
3	12	10 " 6	12	60 " 125	160	" "	152	8500	Caye
4	12	12 " 5¾	12	200 " 300	400	75 to 120	188	9900	Ceya
5	12	12 " 6	12	110 " 175	225	75 to 140	219	9200	Ciyo
6	12	12 " 7	12	60 " 125	160	" "	219	9400	Coyu
7	13	12 " 5¾	12	200 " 3 0	400	75 to 120	188	10200	Cuye
8	14	14 " 7	16	110 " 175	225	60 to 120	342	13000	Cymp
9	14	14 " 8	16	60 " 125	160	" "	342	13400	Culn
10	16*	13 " 5½	16	200 " 300	400	60 to 100	245	15300	Cwyn
11	20*	13 " 5½	16	200 " 300	400	" "	245	15600	Celp
12	16*	14 " 7	16	110 " 175	225	60 to 120	342	13700	Clep
13	16*	14 " 8	16	60 " 125	160	" "	342	14100	Clos
14	16*	16 " 8	20	110 " 175	225	60 to 100	464	17700	Clug
15	16*	16 " 9	20	60 " 125	160	" "	464	17900	Clim

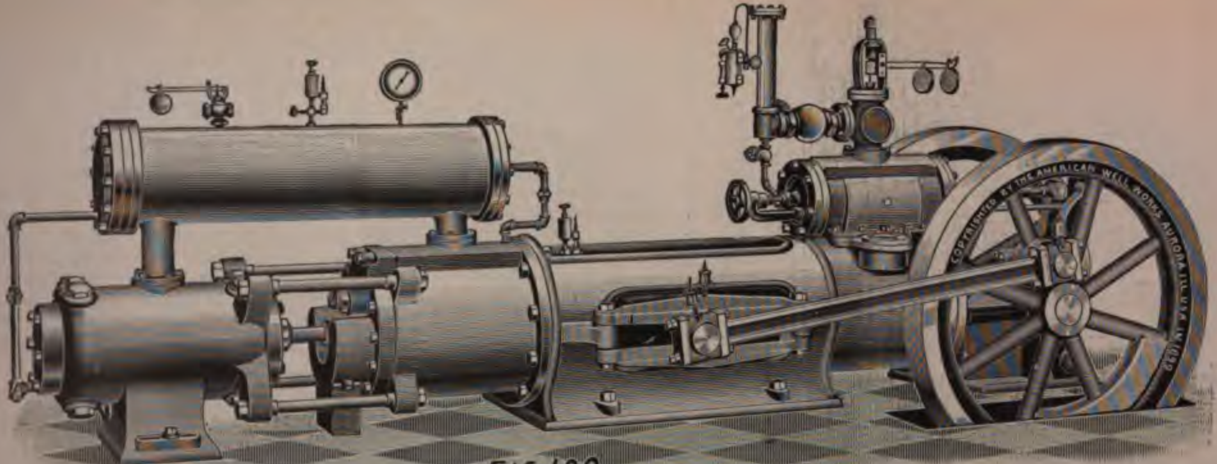

FIG 100

Balanced Adjustable Steam Cut-Off Double Compression Air Compressor.

Fig. 100 shows our Balanced Adjustable Cut-off Steam Valve Double Compression Air Compressor for higher air pressure than Fig. 101 single compression machine. Steam valve is our balanced adjustable cut-off which engineer can set to cut off steam with quick cut off at any point suited to work. It permits high initial air pressure to start wells pumping with Chapman's Air Water Lift System, and of cutting off steam at a determined portion of its stroke, permitting the engine to be driven by the expansion of steam, as is done in the Corliss type. Steam cylinder is cast double for dead air jacket to prevent condensation. It is also covered with asbestos and sheet steel jacket. Air cylinders have our well known poppet air inlet and discharge valves, are completely water jacketed sides and covers, and are provided with inter-cooler by which much power is saved. Air valves may be removed without disturbing covers, and they cannot be drawn into cylinders. By compressing air to low pressure, then cooling it and compressing it in high pressure cylinder, over 40% of maximum strains incident to compressing in a single cylinder are saved. Swiveled crosshead and center pin have perfect take up for wear and are steel. Air pressure steam governor is provided. governor if preferred.) It controls machine and shuts it down in case of excessive pressure or great loss of pressure, avoiding accident. Combined speed and air pressure governor is furnished at slight cost. Sizes listed are for 50 to 100 R.P.M. Low speed increases life of plant. **Prices:**–We make prices on Air Water Lift and Air Power Plants, and sell compressors separately.

No.	Diam. Cylinders, In			Str. In.	Floor space, feet.	Work'g Air Pres for.	Temporary Pres. for.	Cu. Ft. free air per minute.	Apx. Wts. lbs.	Code.
	Steam	L. P. A.	H. P. A.							
1	16	16	8	20	17x4¼	110–175	225	464	17900	**Cola**
2	16	16	9	20	17x4¼	60–125	260	464	18100	**Culi**
3	20	20	10	24	20x5	110–175	225	872	22300	**Cewo**
4	20	20	12	24	20x5	60–125	160	872	22600	**Cawe**
5	20	20	10	30	23x5	110–175	225	1090	28500	**Ciwa**
6	20	20	12	30	23x5	60–125	160	1090	29000	**Cowi**

team Duplex Air Compressor.

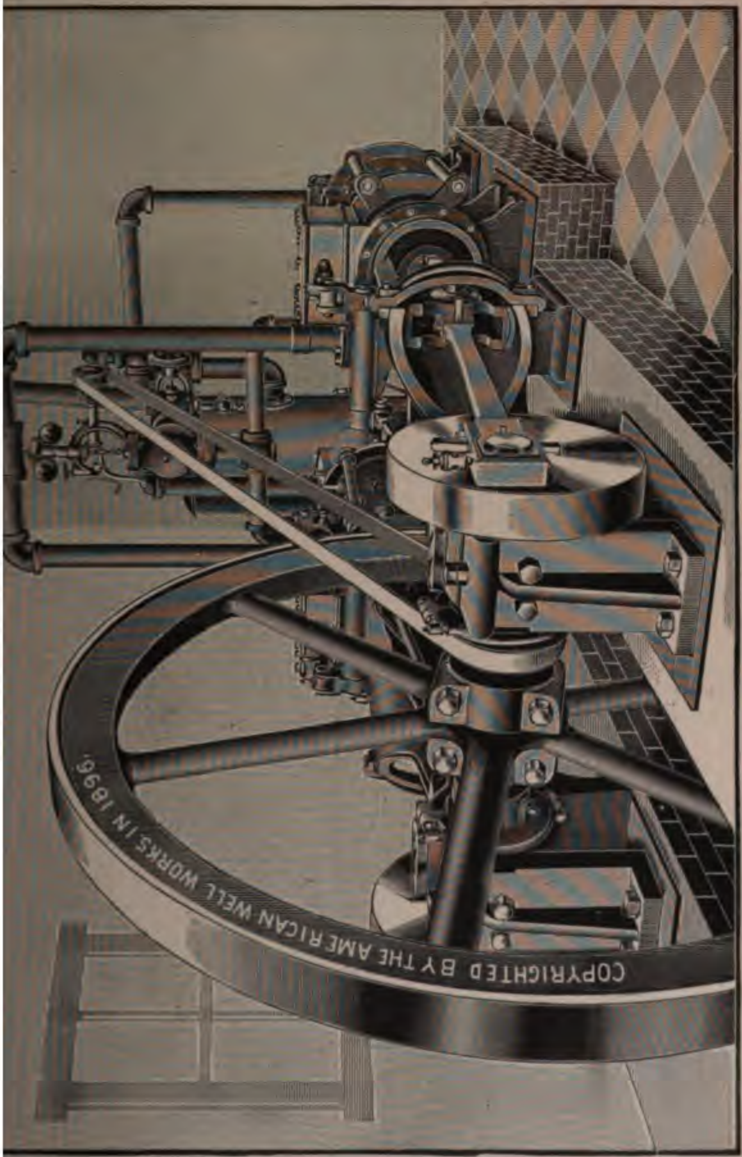
COPYRIGHTED BY THE AMERICAN WELL WORKS IN 1896.

FIG. 1560.

60 is an illustration from a photograph of one of our steam driven Duplex Air Com-
ervice, raising water 80 ft. from three artesian wells by Chapmans' Patent Air Lift
of 3,000,000 gallons capacity per day. We build this pattern of size to suite require-
ting or conveying up to 10,000,000 gallons of water per 24 hours.

a thoroughly reliable compressor, well made and finished, and is suitable for all pur-
ing large quantities of compressed air. Any number of wells may be operated with
thout engineer leaving engine room.

d this compressor either single or compound, and also of the Corliss Engine type.
d prices on specifications.

ke Gasoline, Gas or Natural Gas Air Compressors for localities where price of coal

241429

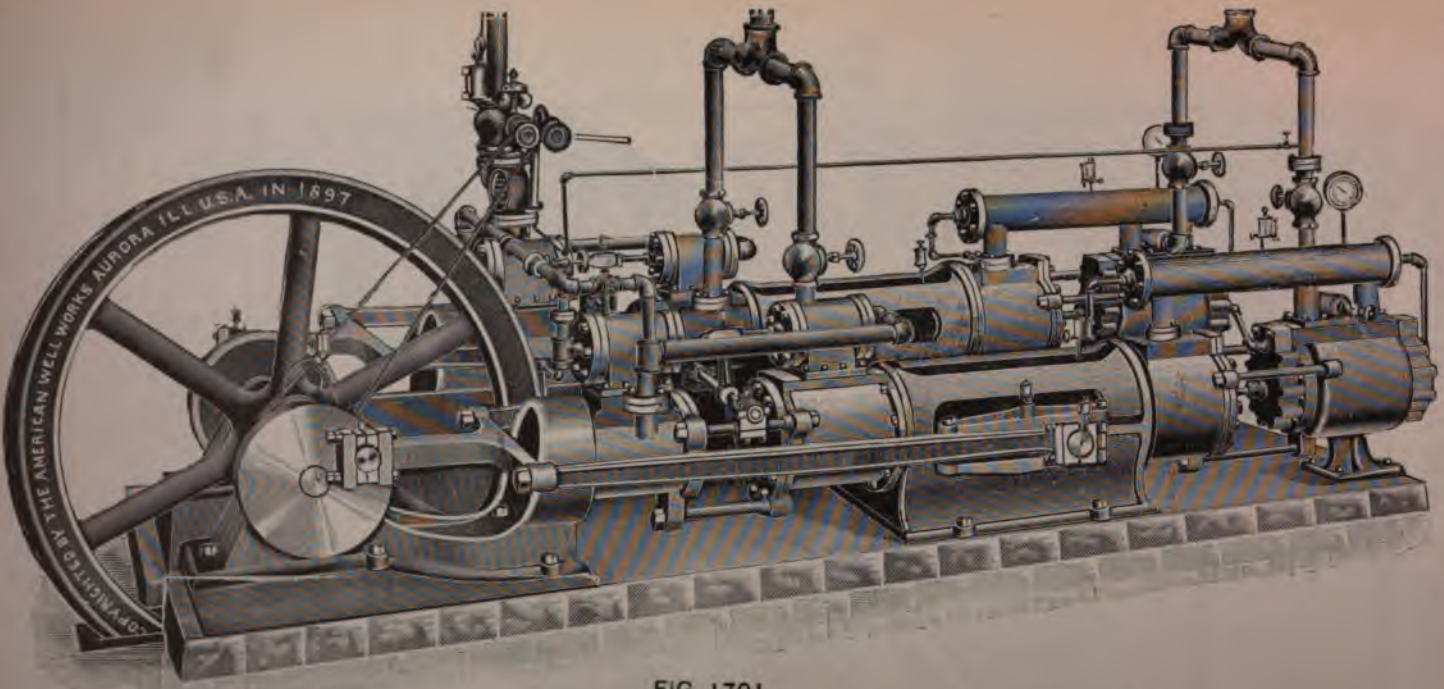
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FIG. 1701.

Duplex Compound Steam Driven Air Compressor.

Fig. 1701 is made from a photograph of our duplex tandem double expansion steam, duplex tandem double compression air compressor.

It is suitable for compressing air to 200 lbs. per square inch and maintaining a working air pressure of 75 to 160 pounds.

It is used by water works companies for raising water from deep wells by Chapman's Patent Air Water Lift System, for bringing or conveying water long distances

has speed and air pressure steam governor maintaining a fixed air pressure. Steam valves are our balanced piston valves. Air inlet valves and stems are forged in one and seat on bronze seats with fixed stop preventing drawing into cylinders. All air valves may be removed without removing cylinder covers. Free air hoods to get cold air outside warm engine room are provided. There are no dead centers.

Either side may be run alone. Steam power is applied in direct line of resistance

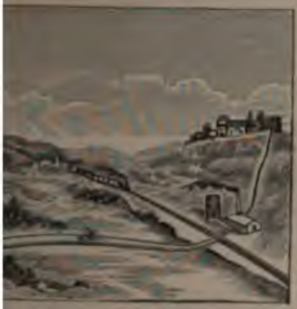

Fig. 1605.

hted 1895 by The American Well Works.

Fig. 1605 is a small sketch showing how we convey water by the application of air, to any height and distance from lakes, rivers or wells for the use of railway stations, factories, village or city uses. The picture illustrates its application. The air is compressed in engine room by one of our air compressing engines as may be best adapted. If the water is to be conveyed for miles, the friction in transit of water should be taken into account. (See Air Friction Table.) Where all pressure of air is required not exceeding approximately 60 bs., our single air compressing engines can be used to advantage, but where an air pressure is required of 60 to 300 lbs., then our double compression air engine should be used. When over 300 lbs., we use a third cylinder which makes three compressions. The air is partly compressed in the large cylinder, is cooled, then again compressed in the small cylinders. It is more economical to use the compound air compressing engine when high pressures are required; for example, the air at 60° when reduced to one-fourth its natural volume, would have a pressure of 45 lbs. Its temperature has then increased to 317°, the approx. heat of steam at 75 lbs. pressure; in proportion as the volume of air has been reduced, its heat increases. By cooling the compressed air in transit from compression to compression, the compressing engine can be practically operated. If the area of the large air cylinder is four times the next cylinder, the steam will act with he advantage it would in the large cylinder, and hence put up four times the pressure with the l force which produces a great saving when a high air pressure is required. The pressure of steam the air pressure required, must be known, to proportion the size of the cylinders to each other to economical results. Compounded or Triple Expansion Condensing Engines should be used if the ical results in the expense of fuel is an object.

1570 is from a photograph of our **Chapman's Patent Duplex Water In-take,** (also made single.) matic water engine which is operated by a current of air and is placed in rivers, lakes, or wells in mp for delivering water any height or distance, by the application of air under pressure, miles if necessary from the engine that puts up the air pressure. It delivers a continuous stream of water. When one side is filling, the air is forcing the water from the other to its destination. The automatic mechanism requires no oil or attention: being inside: is sand and dirt proof, there being no stuffing boxes to adjust or stop its action. It is provided with a very large strainer which prevents foreign substance entering. Its automatic switch that switches the air from one cylinder to the other, is non-corrosive and balanced, requiring nominally no power to operate. It performs the service of a pump without pistons or working parts that are commonly worn. The air forms the piston, hence there is no wear. Will perform all of the duties of moving water a steam pump will, without loss by condensation. It will work successfully in water whose rise and fall may vary hundreds of feet.

One gallon of air will bring the same amount of water a short distance allowing ⅜ lb. of air pressure for each foot of lift.

The application of air assists to purify the water and lowers it temperature.

Air power can be conveyed through pipes a great distance with a less loss of power than by any other mechanical means.

Air will conduct muddy water without injury to its machinery.

The air system produces a saving of operating a separate pumping plant when water is to be brought from a distance, as the air engine requires only such attention as a steam engine, and that can be given by the engineer in his engine room.

Air can be compressed by any of the known means of line and gas engines, steam engine, water power, wind, etc.

r systems are the most economical means of raising water from any depths, and bringing it long disout respect to their locations, operating several water plants with the same system.

ks O. K. when set on a raft or skid to be moved on a river bank as the water rises or falls and for removal. water at any number of places and at various elevations.

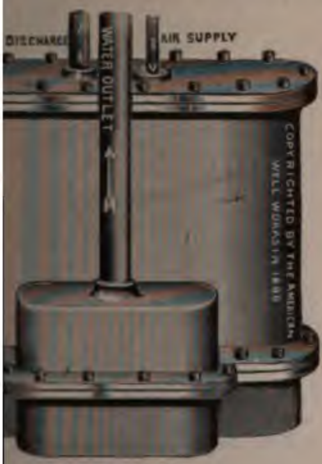

Fig. 1570.

PRICES AND DIMENSIONS OF

ig. 1570 Chapman's Water In-take.

allons per min., (50% more can be	15	25	40	75	100	150	200	350	500	750	1000	1500	2000	2500	3000
water Discharge Pipe	1	1¼	2	2½	3	4	5	6	7	8	10	12	14	15	16
r Supply Pipe	⅜	¾	1	1¼	1½	2	2	2½	3	3½	4	5	6	6	7
ight Iron Pipe Connections			$90	$150	$180	$275	$300	$400	$475	$550	$600	$900	$1200	$1500	$1800

hese prices and dimensions are for a 150 ft. lift or less.
s for higher lifts on application.

Air Receivers and Pressure Tanks.

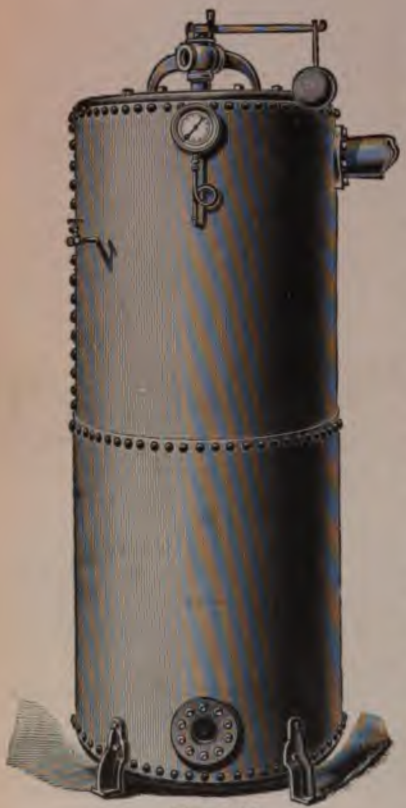

Fig. 1548.

Fig. 1548 shows our large Air Receiver, but it is furnished without hand-hole or foot pieces, which are unnecessary. It is made of 60,000 lbs. T. S. steel, and side seam is double riveted.

Fixtures include safety valve, pressure gauge, drain valve, and flange taps for inlet and outlet pipes.

Fig. 69 shows our Seamless Steel Receiver and Oil Separator. It is furnished with the fittings shown, together with drain valve not shown, and is internally fitted for separating oil from the compressed air. It is suited for air pressures under 200 lbs. per square inch. They are tinned inside and out. They are furnished in diameters of 10 to 14 inches, and length of approximately five feet over all, depending upon the run of tubes from mill. At times, under present state of manufacture, these tubes are not obtainable, and in such exigency, we made Fig. 69 of wrought iron tube with screw caps, otherwise fitted and made as shown in illustration.

Price Fig. 69 Air Receiver Oil Separator as descrided. (Code, **Cooho**) **$35.00**

THE AMERICAN WELL WORKS AURORA ILL U.S.A.
FIG 6

Fig. 6

PRICES FIG. 1548 AIR RECEIVER, IMPROVED.

Diameter Inches		**24**	**30**	**36**	**42**
Height, Feet		**5**	**5**	**6**	**8**
Approx. Wt., Lbs.		500	700	1000	1400
Shell,	Inches	¼	¼	¼	¼
Heads	"	5-16	5-16	⅜	⅜
Top tap	"	3	3	4	4
Side Outlet	"	2½	2½	3	4
Drain Tap	"	¾	¾	1	1
Pressure for, Lbs.		200	200	200	150
Code		Coobo	Cooco	Coodo	Coofo
Price, with trimmings		**$75.**	**$90.**	**$120.**	**$160**

Compressed Air Tools.

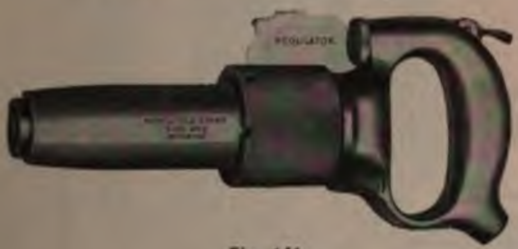

Fig. 141.

Fig. 141 illustrates an improved Air Hammer for riveting, chipping, calking, ther uses. Compressed air is conducted from the receiver to the tool, at- ng to lower side of the handle. It performs the work of four men beading and like uses.

Fig. 142 shows an improved Air Hoist for use in shops and handling heavy machinery, or any other hoisting purposes for which quick and efficient work is required. The hoist is controlled by the inlet lever to run fast or slow as desired.

Fig. 143 shows an Improved Rock Drill for quarry and excavation work. Air is conducted to the drill from receiver through the hose shown in cut.

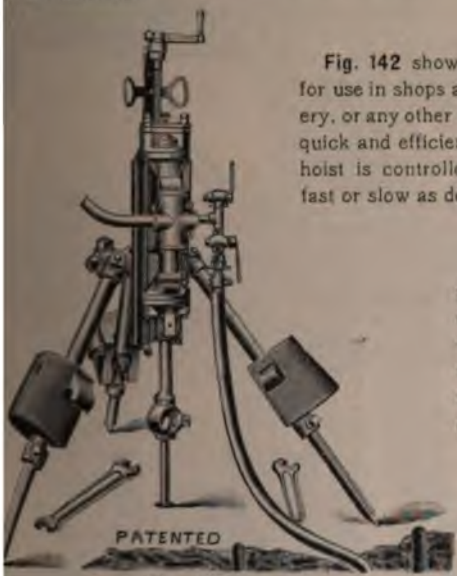

Fig. 143.

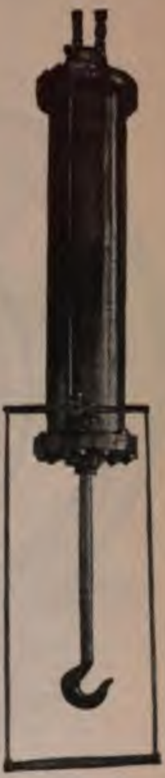

Fig. 142.

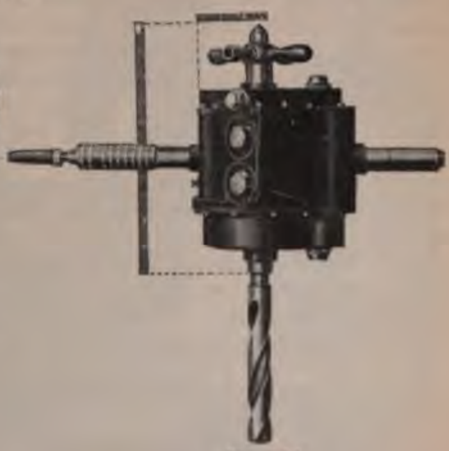

Fig. 144.

Fig. 144 shows an Improved Portable Drilling ine for conveniently drilling holes in heavy inery on shop floor, in bridge work, or any where a portable drill can be clamped to its .

Prices on all tools shown on this page will be furnished on application, indicating the work which have to do. They are sold in connection with our air compressors, and complete plants will be shed by us.

Gasoline Deep Well Pumping Engine.

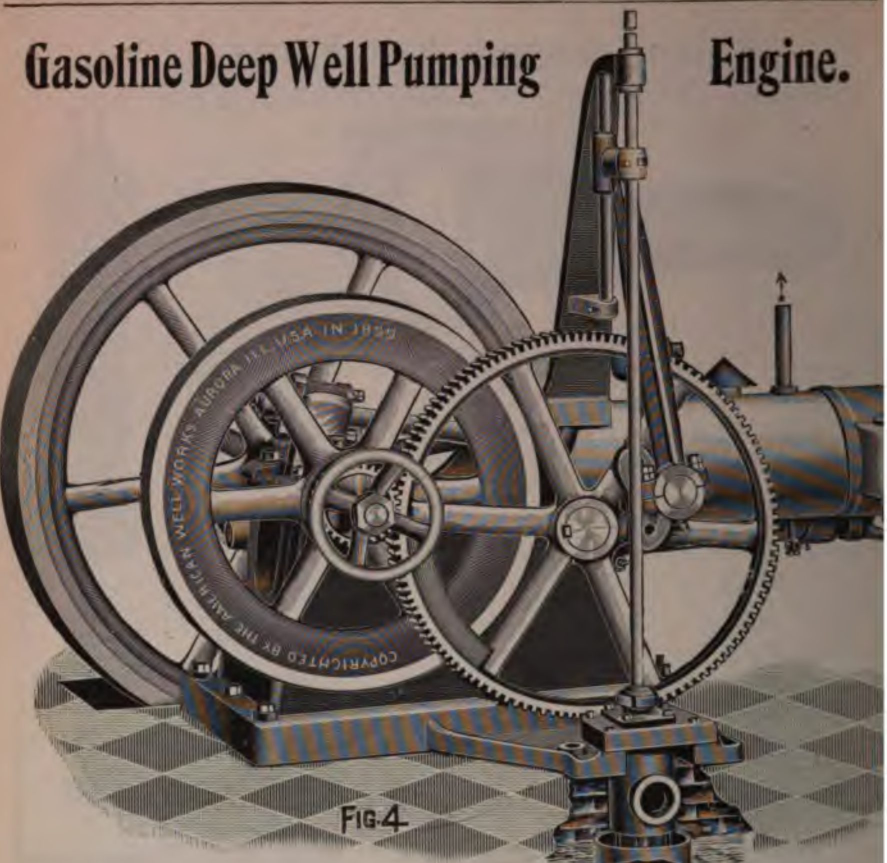
COPYRIGHTED BY THE AMERICAN WELL WORKS AURORA ILL. U.S.A. IN 1899
FIG 4

Fig. 4 shows one of our Gasoline Driven Artesian and Deep Well Pumping Engines. It is compact and complete in itself without belts. It is suited for all kinds of deep well pumping and is most economical and practical. For engine description see our gasoline engine circulars. The gears are cut and run smoothly. Hand friction clutch permits engine to run without pump for starting, or for driving other machinery. Gasoline tank for 5 horse and larger placed outside of building and smaller sizes fitted in same way at slight cost. We furnish tube, electric battery, or dynamo igniters. Well valves may be drawn up without disturbing engine. Heavy pump rods may be handled by spool if placed on engine shaft.

Engine furnished complete with:
- Double Face Pulley.
- Gasoline Tank Connected.
- Exhaust Muffler Connected.
- Single Battery, Coil, Switch, Wire (if battery.)
- Tube Burner Connected (if tube engine.)
- Water Cooling Tank Connected (extra if ordered.)

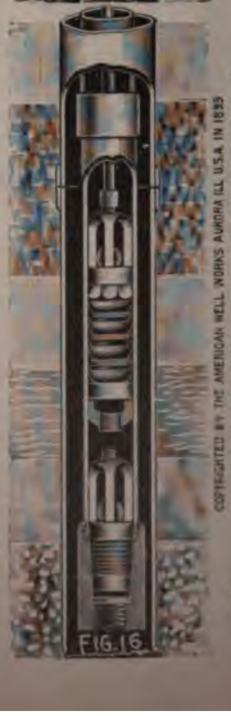
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FIG 16

Sizes—M
tured in 11
to 18 H. P.,
pump stroke
6, 8 and 10
2 H. P., to
and 24 inch
largest sizes.

Prices—
questions on
page; descri
and work to
or send for
question sh
will quote
outfit.

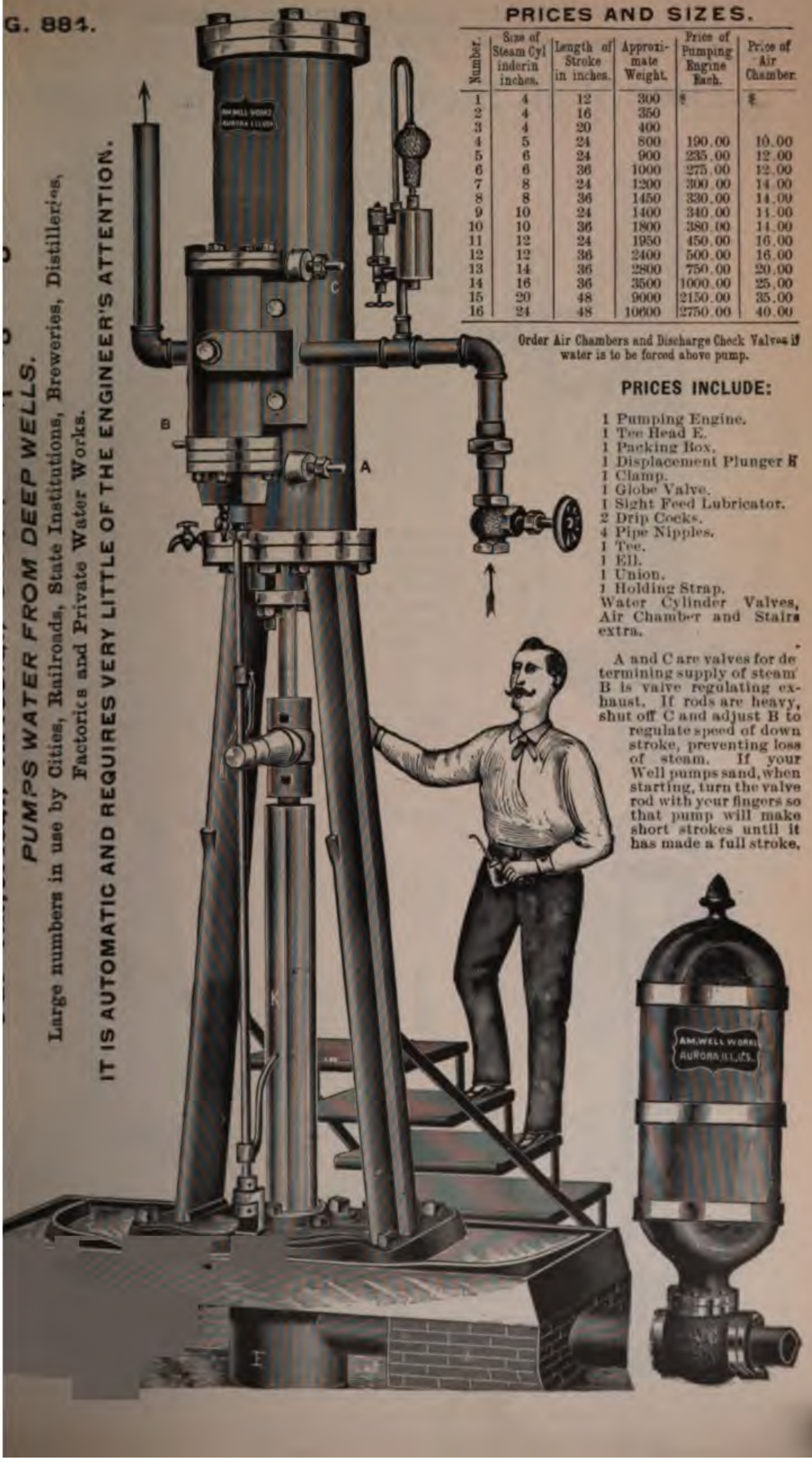
Fig. 16
Illustration

G. 884.

PUMPS WATER FROM DEEP WELLS.

Large numbers in use by Cities, Railroads, State Institutions, Breweries, Distilleries, Factories and Private Water Works.

IT IS AUTOMATIC AND REQUIRES VERY LITTLE OF THE ENGINEER'S ATTENTION.



PRICES AND SIZES.

Number.	Size of Steam Cylinder in inches.	Length of Stroke in inches.	Approximate Weight.	Price of Pumping Engine Each.	Price of Air Chamber.
1	4	12	300	$	$
2	4	16	350		
3	4	20	400		
4	5	24	800	190.00	10.00
5	6	24	900	235.00	12.00
6	6	36	1000	275.00	12.00
7	8	24	1200	300.00	14.00
8	8	36	1450	330.00	14.00
9	10	24	1400	340.00	14.00
10	10	36	1800	380.00	14.00
11	12	24	1950	450.00	16.00
12	12	36	2400	500.00	16.00
13	14	36	2800	750.00	20.00
14	16	36	3500	1000.00	25.00
15	20	48	9000	2150.00	35.00
16	24	48	10600	2750.00	40.00

Order Air Chambers and Discharge Check Valves if water is to be forced above pump.

PRICES INCLUDE:

1 Pumping Engine.
1 Tee Head E.
1 Packing Box.
1 Displacement Plunger K
1 Clamp.
1 Globe Valve.
1 Sight Feed Lubricator.
2 Drip Cocks.
4 Pipe Nipples.
1 Tee.
1 Ell.
1 Union.
1 Holding Strap.
Water Cylinder Valves, Air Chamber and Stairs extra.

A and C are valves for determining supply of steam. B is valve regulating exhaust. If rods are heavy, shut off C and adjust B to regulate speed of down stroke, preventing loss of steam. If your Well pumps sand, when starting, turn the valve rod with your fingers so that pump will make short strokes until it has made a full stroke.

Deep Well Steam Pumping Engine

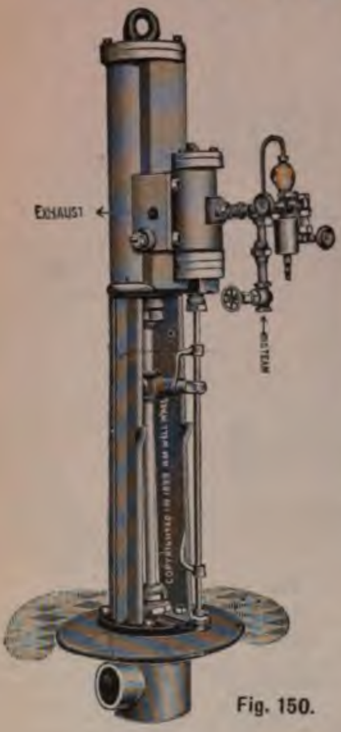
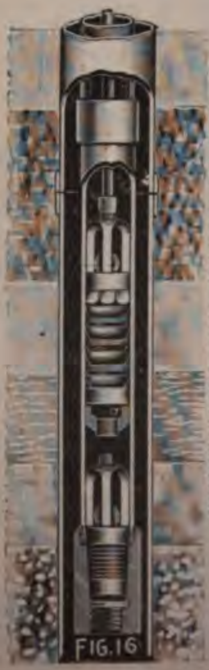


Fig. 150.

Fig. 150 illustrates our small sized Deep Well Pumping Engine. It is similar to Fig. 884, and is tha modified to make small sizes. Steam valve is our balanced valve, which operates easily and econor Choke valves in steam ports adjust inlet of steam required on up and down strokes. A like valve exhaust to prevent too quick downward stroke, givin a steady motion. Tee head is provided with side di from which water is piped to desired point. If wate forced above pump 25 ft. or more, or through l charge, or crooked pipes, use Fig. 37 Combined Air C and Discharge Check Valve, placing it close to pump will remove shocks and strains from pump. The eng be removed from base without disturbing discharge p nections, and to releather valves, packing box is remo plunger valve drawn up. This pumping engine is us Fig. 1382 deep well working barrels, as here illustr Fig. 16, which shows an imaginary section of well the pump. These small pumps are great favorit creameries, manufacturing plants, and the like, ordinary quantities of water are required. Where pressure often varies much during the day, it is well chase with pump a reducing valve so that steam pres pump will be constant, and obviate necessity of attention.

Furnished:–We furnish Fig. 150 Steam Pumping with ¼ pint lubricator, and steam connections as sho

To make a complete plant for a deep well, you w in addition to above, wood rods, water pipe, a Fig. other working barrel, and air chamber and discharg valve if water is to be forced, all of which you w illustrated on other pages.



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PRICES FIG. 150 PUMPING ENGINE.

No.	Diam. Cyl. In.	Length Stroke. In.	Floor Space, Ft, Sq.	Height, Ft.	Steam and Water Pipes.				Code.
					Stm.	Exh.	Suct.	Discg.	
1	4	8	1¼	3½	½	¾	2½	1½	Pehlo
2	5	8	"	"	¾	1	3	2	Peiso
3	4	12	1½	4	½	¾	3	2	Pejom
4	4	16	"	4⅔	½	¾	3	2	Peleo
5	4	20	"	5¼	½	¾	3	2	Peque

Bottom of pump piston rod has ½ inch pin pipe thread, on placed a ½ x ⅜ inch reducing coupling so either ⅜ or ½ in leable wood rod coupling will fit.

When using solid steel pump rods, to make connection, order prices:—

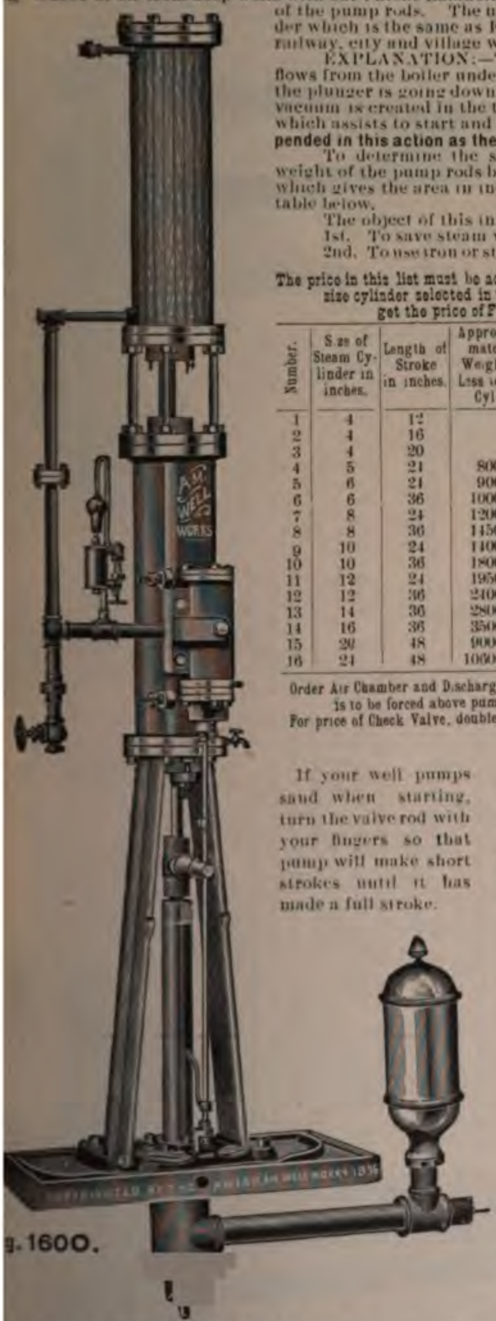
1 Substitute, ⅜ inch pipe to ⅜ inch bolt thread ——(Pemno
1 " ⅜ " " " 7-16 " " " ——(Penhi)

When using Fig. 517 wrought wood rod couplings to make con orderat extra price:—

1 Substitute, ½ inch pipe to ⅝ inch pin, Fig. 517.——(Peopo
1 " ½ " " " ⅞ " " " 517.——(Pepro

PATENT STEAM SAVER.

ig. 1600 is an illustration from a photograph of one of our Deep Well Steam Pumping Engines, for g water or oil from deep wells with our Patent Balancing Cylinder for lifting and supporting the weight of the pump rods. The movement of the pump is made by the lower cylinder which is the same as Fig. 884, which has been so extensively used for railway, city and village water works, factory and general purposes.



g.1600.

EXPLANATION:—The upper cylinder has a piston into which steam flows from the boiler under the piston at the bottom of the cylinder. When the plunger is going down the steam flows back again into the boiler. A vacuum is created in the top of the balancing cylinder on the down stroke which assists to start and lift the pump plunger. **No steam is lost or expended in this action as there is no exhaust to the atmosphere.**

To determine the size of balancing cylinder required, divide the weight of the pump rods by four-fifths of the lowest working steam pressure, which gives the area in inches of cylinder required. We now refer you to table below.

The object of this invention is:
1st. To save steam when using wood rods.
2nd. To use iron or steel pumping rods for great depths and small bores—

The price in this list must be added to the price for the size cylinder selected in the list below, to get the price of Fig 1600.

Number.	Size of Steam Cylinder in inches.	Length of Stroke in inches.	Approximate Weight. Less top Cyl.	Price of Pumping Engine each. Less top Cyl.	Price of Air Chamber.
1	4	12		$	$
2	4	16			
3	4	20			
4	5	21	800	190.00	10.00
5	6	21	900	235.00	12.00
6	6	36	1000	275.00	12.00
7	8	24	1200	300.00	14.00
8	8	36	1450	330.00	14.00
9	10	24	1400	310.00	14.00
10	10	36	1800	380.00	14.00
11	12	24	1950	450.00	16.00
12	12	36	2400	500.00	16.00
13	14	36	2800	750.00	20.00
14	16	36	3500	1000.00	25.00
15	20	48	9000	2150.00	35.00
16	24	48	10000	2750.00	40.00

Order Air Chamber and Discharge Check Valve if water is to be forced above pump.
For price of Check Valve, double list for Air Chamber.

PRICES INCLUDE:

1 Pumping Engine.
1 Tee Head.
1 Packing Box.
1 Displacement Plunger.
1 Clamp,
1 Globe Valve.
1 Sight Feed Lubricator.
2 Drip Cocks.
4 Pipe Nipples.
1 Tee.
1 Ell.
1 Union.
1 Holding Strap.
With the top Balencing Cylinder, Oil Cup, three Nipples, Check and Globe Valves.

Nos 1 to 3 have a steel or brass rod in place of displacement plunger

Water Cylinder Valves, Air Chamber and Stairs extra.

A and C are valves for determining supply of steam. B is valve regulating exhaust. [See Fig. 884.]

If your well pumps sand when starting, turn the valve rod with your fingers so that pump will make short strokes until it has made a full stroke.

PRICE OF TOP CYLINDER ONLY.

This price for the size required in the lower table, must be added to the price for the sizes wanted in the top table to get the price of Fig 1600.

Diam. of Cyl. inches.	Net Area of Cylinder in inches.	Length of Stroke in inches.	Approximate Weight.	Price for Top Balencing Cyl only.
3	6.62	24	100	$ 40.00
4	11.57	24	130	44.00
5	18.48	24 36	150 200	64.00 78.00
6	27.04	24 36	275 300	80.00 100.00
8	48.81	24 36	300 400	100.00 125.00
10	76.77	24 36	400 530	115.00 154.00
12	110.68	36 48	800 1000	166.00 200.00
14	151.17	36 48	900 1200	250.00 300.00

When the water is not elevated above the surface, we will furnish a steel or brass rod in place of the displacement plunger (Has less friction.)

Chapman's Patent Air Tight X Pipe Pump Rods. with guides, connected with patent Sleeve Couplings: used with Fig 1600.

side diam., inches	.81	1.05	1.32	1.66	1.9	2.37	2.87	3.5	4	4.5	5	5.56	6.62
ght per foot lbs	1.09	1.39	2.17	3	3.61	5.02	7.67	10.25	12.47	14.97	18.22	20.51	28.58
e per ft. Blk.	$ .16	$ .19	$ .26	$ .35	$ .58	$ .70	$1.04	$1.36	$1.62	$1.90	$2.50	$2.84	$3.70
per ft. Galv.	.21	.26	.37	.50	.76	.95	1.39	1.86	2.22	2.65	3.40	3.84	5.10

CHAPMAN'S PAT'D AMERICAN PUMPING ENGINES.

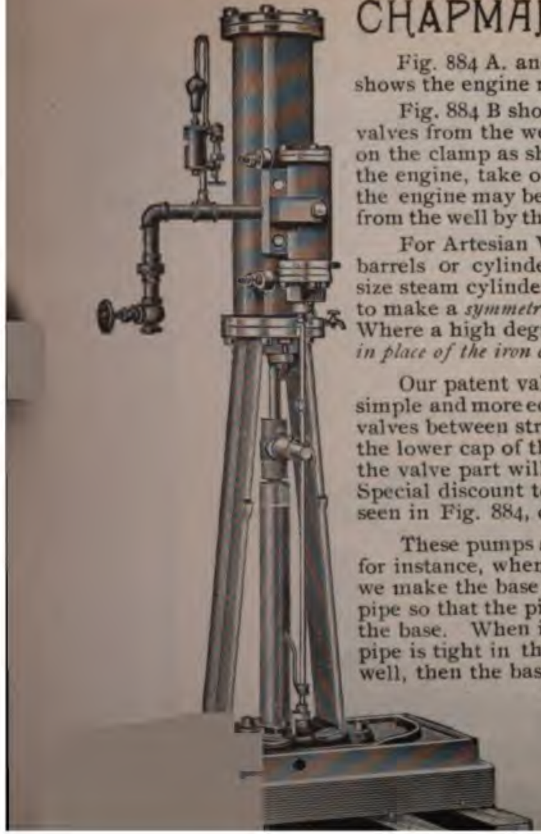


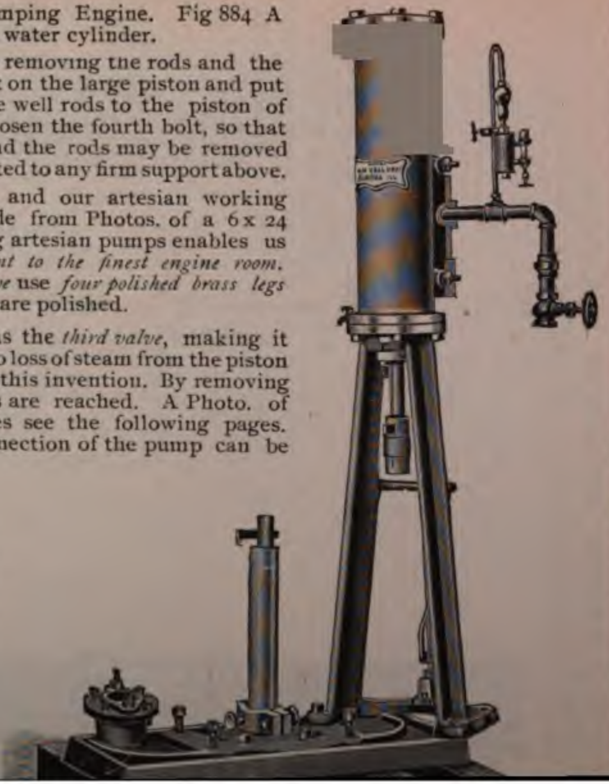
Fig. 884 A. and 884 B, show our American Artesian Pumping Engine. Fig 884 A shows the engine ready for work, as when connected to the water cylinder.

Fig. 884 B shows the engine swung back in position for removing tne rods and the valves from the well. First loosen the stuffing box, raise it on the large piston and put on the clamp as shown, driving out the key which holds the well rods to the piston of the engine, take out three bolts on base, and be sure and loosen the fourth bolt, so that the engine may be swung around into position as shown, and the rods may be removed from the well by the use of block and falls, they can be connected to any firm support above.

For Artesian Working Barrels see Figs. 885 and 886, and our artesian working barrels or cylinders in general. The illustrations are made from Photos. of a 6 x 24 size steam cylinder. Our long experience in manufacturing artesian pumps enables us to make a *symmetrical and a handsome engine that is an ornament to the finest engine room.* Where a high degree of artistic ornamentation is desired, *we* use *four polished brass legs in place of the iron ones.* The ends of the cylinders and caps are polished.

Our patent valve motion *dispenses* with what is known as the *third valve*, making it simple and more economical in the use of the steam, there is no loss of steam from the piston valves between strokes, about 7 per cent. of steam is saved by this invention. By removing the lower cap of the small auxiliary cylinder, all the valves are reached. A Photo. of the valve part will be furnished to purchasers. For prices see the following pages. Special discount to agents. The foundation and water connection of the pump can be seen in Fig. 884, on next page.

These pumps are made to suit the various conditions, for instance, when the pipe is to hang into a well, then we make the base of the pump to hold the weight of the pipe so that the pipe can be taken up without removing the base. When in an artesian or tubular well where the pipe is tight in the ground and forms the wall of the well, then the base is screwed to the pipe, but in each instance the working barrel and valves can be removed without removing the base or the water outlet under the base.



Railroad Pumping Engine.

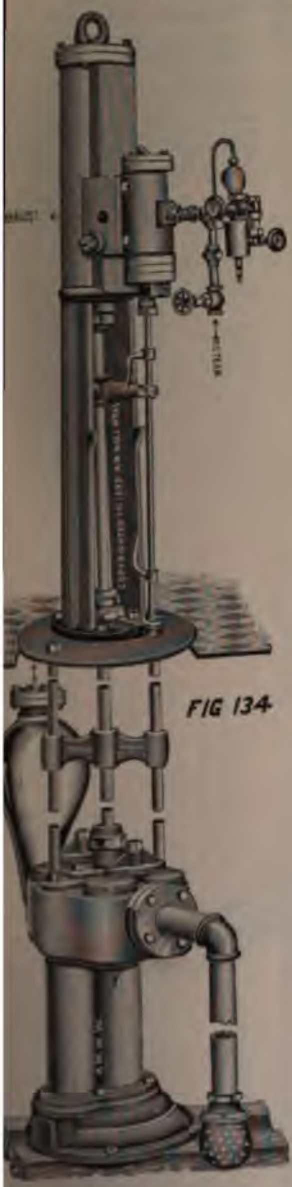


FIG 134

Fig. 134 shows our Double Acting Steam Driven Railroad Waterworks Pumping Plant, for pumping water from open wells, pits, mines and locations where it is desired to have steam head on surface and pump part within suction distance of water supply.

Steam head is our Figs. 150 and 884 pumps, 24 inch stroke and under, which is furnished complete, and shipped with tee head and packing box ready to screw to pipe of a tubular well so that steam head may be used either for operating the Curtis pump shown, or used as a deep well pump, making it interchangeable, and an important feature for railroads, having both open and drilled wells to pump.

Pump shown is our Curtis Double Acting Pump, known to railroad users as a thoroughly reliable pump in every respect, and needs no further description.

Pump is fastened to timbers at or near water supply. Steam head is placed on timbers over well, and the two connected by steel rods rigidly, and which serve as guides for plunger rod which runs between them.

We furnish these pumping plants any set length desired to adapt them to depth of well. Give length from base of steam head to bottom of Curtis pump.

Furnished:—Constituting this plant we furnish the Steam Head, Curtis Pump, 2 Steel Connecting Rods (length you order) and Steel Pump Rod and Guide at the additional price listed but **do not furnish** Suction Pipe nor Foot Valve unless expressly included in quotation or ordered at additional price.

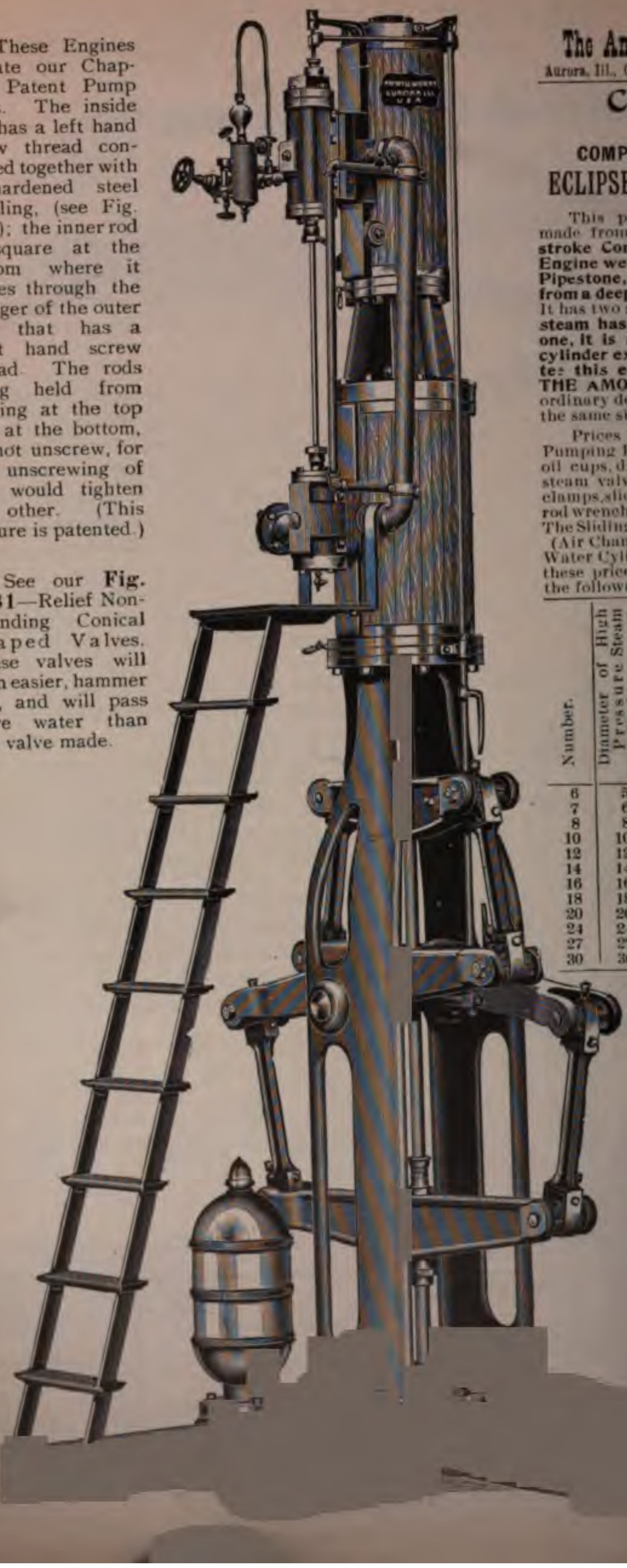
*Give length of connecting rods wanted; thus, "Pebla twelve" will mean No. 1 Fig. 134 12 ft. base pump to base steam head.

PRICES OPEN WELL PUMPING ENGINE.

Diam. Cyl. Steam Head.	Diam. Water Pump Plgr.	Stroke.	Gals. per Rev. less 10%	Steam Pipe.	Exh. Pipe.	Suct. Pipe.	Discg. Pipe.	Code* without connecting rods.	Price* without connecting rods.	Add per ft. for connect'g and plg'r rods.
4	3	12	66	½	¾	2	1½	Pebla	$122.	$2.50
4	4	12	1 17	½	¾	2½	2	Pebco	135.	2.50
4	3	16	88	½	¾	2	1½	Pecco	144.	2.50
4	4	16	1 36	½	¾	2½	2	Pedcu	164.	2.50
5	5	24	2.68	1	1¼	3	2½	Pedje	255.	3.50
6	5	24	2.68	1	1¼	3	2½	Pefal	290.	4.25
6	6	24	5.28	1	1¼	4	3½	Peffee	320.	4.25
8	5	24	2 68	1¼	1½	3	2½	Pefgo	335.	4.25
9	6	24	5 28	1¼	1½	4	3½	Pegge	365.	4.25

These Engines operate our Chapman Patent Pump Rods. The inside rod has a left hand screw thread connected together with a hardened steel coupling, (see Fig. 1582); the inner rod is square at the bottom where it passes through the plunger of the outer rod that has a right hand screw thread. The rods being held from turning at the top and at the bottom, cannot unscrew, for the unscrewing of one would tighten the other. (This feature is patented.)

See our **Fig. 1581**—Relief Non-Pounding Conical Shaped Valves. These valves will open easier, hammer less, and will pass more water than any valve made.



The American Well Wo
Aurora, Ill., Chicago, Ill., Dallas, Te

Chapman's
PATENT
COMPOUND TWO-STRO
ECLIPSE PUMPING EN

This picture of **Fig.** 1
made from a photograph w
stroke Compound Steam
Engine we made for the v
Pipestone, Minn., to pum
from a deep well for its wate
It has two steam cylinders,
steam has been used in t
one, it is again used in t
cylinder expansively. We
te: this engine to LIFT
THE AMOUNT OF WATE
ordinary deep well pump wi
the same size.

Prices for **Fig. 1554** inc
Pumping Engine complete
oil cups, drip cocks, three
steam valves, a flanged w
clamps, sliding wrench, ele
rod wrenches, Sight Feed L
The Sliding-back Lever and
(Air Chamber, Pumping V
Water Cylinder are not in
these prices. For prices of
the following pages.)

Number.	Diameter of High Pressure Steam Cylinder.	Diameter of Low Pressure Steam Cylinder.	Length of Stroke.
6	5	7	24
7	6	8½	24
8	8	11½	24
10	10	14	24
12	12	17	24
14	14	20	24
16	16	22⅝	24
18	18	25½	24
20	20	28½	36
24	24	34	36
27	27	38	36
30	30	42	36

Fig. 15

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The American

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S
per
our
gin
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wo

581 illustrates our 2-Plungered Seam-wn Brass or Cast umping Cylinder and It is the water end ping engine; is used l connected by a line o our 2-Plungered ll Pumping Engine ng water, etc.

rts in lower Plunger k Valve are shown d closed in Upper (1) is the Cover s the ports of (2). oses the ports of (3) rops down. (1) has exterior diameter and it allows the pass up on the out-also on the inside. e pump first starts, alve (1), opens; when of water is sufficient, and passes straight the openings in (1, 2 They allow a larger f water to pass than form of valve, and hammering and of pump and rods. hort piece of perfo-pe which prevents ubstances from enter-injuring the valves, art of the well; you ave an independent t bottom of the well, sian or tubular well water is obtained in ravel.

582 illustrates our Solid or Inner Rod on used with Fig. s made of forged steel on the outside, hav-hand thread, and this right hand thread of d in which it works, uncoupling in well as or inner rod is square passes through upper The rods are of the ght iron in pairs of e length and weight ill balance, enabling p to deliver a steady f water

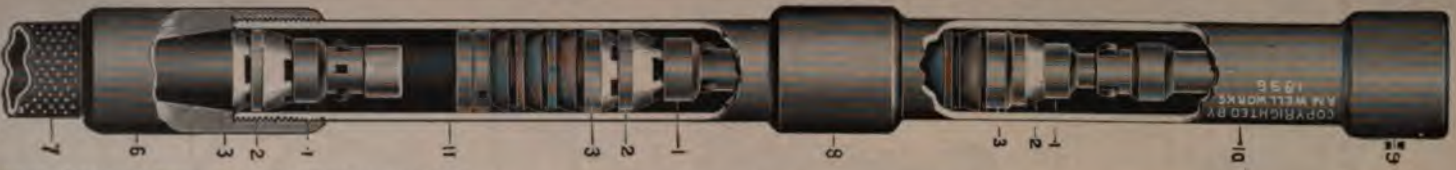


Fig. 1581.

Price List of Fig. 1581, Cylinder and Valves. It is hung into the well on a wrought iron tube ¾ of an inch larger diameter for 7 inches and less; ½ inch for larger sizes to admit of the valves being withdrawn up through the pipe.

Diameter of Pipe it will go in	4½	5	6	7	8	9	10	12	13	15	18	18
Size of Pipe in inches it will connect to	3	3½	4½	5	6	7	8	9	10	12	14	15
Inside size of Cylinder in inches	2¾	3¼	4¼	4¾	5¾	6¼	7½	8½	9½	11½	13	14
Price Fig. 1581 Cyld. and Valves, (Cyld. of Seamless Drawn Brass)	$75.00	$100.00	$130.00	$150.00	$200.00							
Price Fig. 1581 (Bronze cylinder and Valves.)			150.00	175.00	225.00	$275.00	$325.00	$450.00	$600.00	$750.00	$900.00	$1100.00
Price for either Plunger Valve of Fig. 1581	12.00	15.00	20.00	25.00	33.00	42.00	55.00	75.00	115.00	125.00	150.00	166.00
Price for Check Valve of Fig. 1581	10.00	13.00	17.00	21.00	28.00	35.00	46.00	62.00	96.00	104.00	125.00	138.00

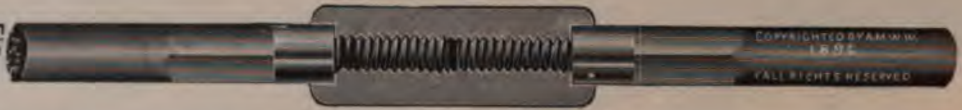
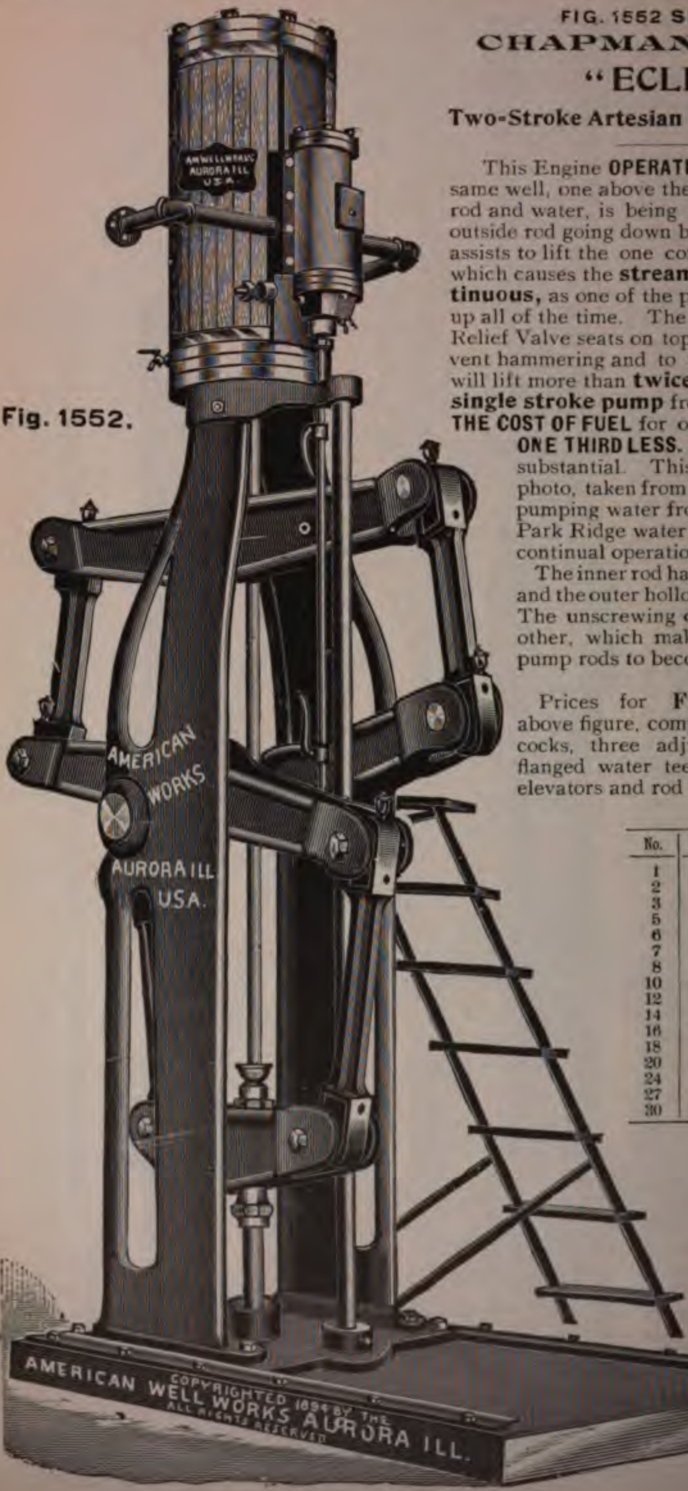


Fig 1582.

PRICE LIST PER PAIR FOR 2-STROKE PUMPING RODS, COUPLINGS AND ROD GUIDES PER FOOT.

Size of Inner Rod in inches	⅝	¾	1	1 3-16	1½
Price per foot, both rods	.30	.45	.60	$1.00	$1.50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AMERICAN WORKS
AURORA ILL USA.
AMERICAN WELL WORKS AURORA ILL.
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Fig. 1552.

FIG. 1552 SHOWS OUR

CHAPMAN PATENT "ECLIPSE"

Two-Stroke Artesian Well Pumping Engin

This Engine **OPERATES TWO PLUNGERS** in th same well, one above the other. When the ins rod and water, is being lifted, the weight of th outside rod going down balances the inner rod an assists to lift the one coming up, and visa ver which causes the **stream of water to be continuous,** as one of the pump plungers is com up all of the time. The valves are conical. Th Relief Valve seats on top of the lower valve to pre vent hammering and to pass more water, and i will lift more than **twice as much water than a single stroke pump** from the same sized wel **THE COST OF FUEL** for operating will be at lea **ONE THIRD LESS.** It is made very heavy and substantial. This picture was made from a photo, taken from a 10x24 now in operati pumping water from a 1300 ft. well for th Park Ridge water works, which has been in continual operation since the Spring of 189

The inner rod has a left hand screw thre and the outer hollow rod a right hand thread. The unscrewing of one would tighten th other, which makes it impossible for th pump rods to become parted in the well.

Prices for **Fig 1552** includes th above figure, complete with oil cups, dri cocks, three adjustable steam valves a flanged water tee, clamps, sliding wrench, elevators and rod wrenches.

No.	Dia.	Stroke.	PRICE.
1	4	12	$
2	5	12	
3	6	12	
5	8	12	
6	5	24	
7	6	24	400.00
8	8	24	500.00
10	10	24	600.00
12	12	24	700.00
14	14	24	800.00
16	16	24	1000.00
18	18	24	1,200.00
20	20	36	2000.00
24	24	36	2800.00
27	27	36	3600.00
30	30	36	4500.00

One of our patent for sliding the Engine back from over the well to a mit of withdrawing the parts of the water pum that is below the ground.

Fig. 1539 shows it sli back.

Warranted to pump water at a less cost than a single stroke deep well pump.

. 1539 Illustrates Our

Stroke Eclipse
mping Engine.

**k in Position for Inserting or
ithdrawing the Pumping
Rods and Valves.**

Engine is slid back on base (Q) by
oving the box (P) from (J), a point
e over any pump in the market,
e and expense of hoisting pump
he well with derrick, and which im-
is protected by patent. The axle
like a crank, so as to admit of the
passing out. **In the old plan the
d (R) worked through a hole in
ould not be slid to one side.) Our
of making a bend in shaft (E),
d (J) to open, and the base (S) to be
or the sliding back of the engine,**
reciated by those who have the old
its bearings have adjustable boxes,
wrist pins fit into tapered holes.
y and exhaust steam pipes have
t part, and when the engine is slid
move back from their mates with-
hing the pipes. One man slides the
from the well and back by means
nd lever furnished.
vo-stroke pumping engine can be
t less expense than a one-stroke, as
alances the other, saving the dead
the plunger rods in a one-stroke

pump rods cannot unscrew, as one
t hand thread, the other a left.
base is large, can be set on any
n. It is provided with a well and
connection (viz., a Flanged Tee),
in Figs. 1534 and 884.
e illustration was made from a photo-
our No. 10, which has a 10-inch steam
24-inch stroke, 8-inch water plun-
pumping water from a 1300 ft. Arte-
at the water works, Park Ridge, Ill,
een in continual use since the spring
this writing, August, 1896, and gives
satisfaction.
CE. Any person making
a 2-stroke Pumping En-
t slides back from over
for repairs, infringes our
and will be prosecuted,
ped from using it, and
collected for infringe-

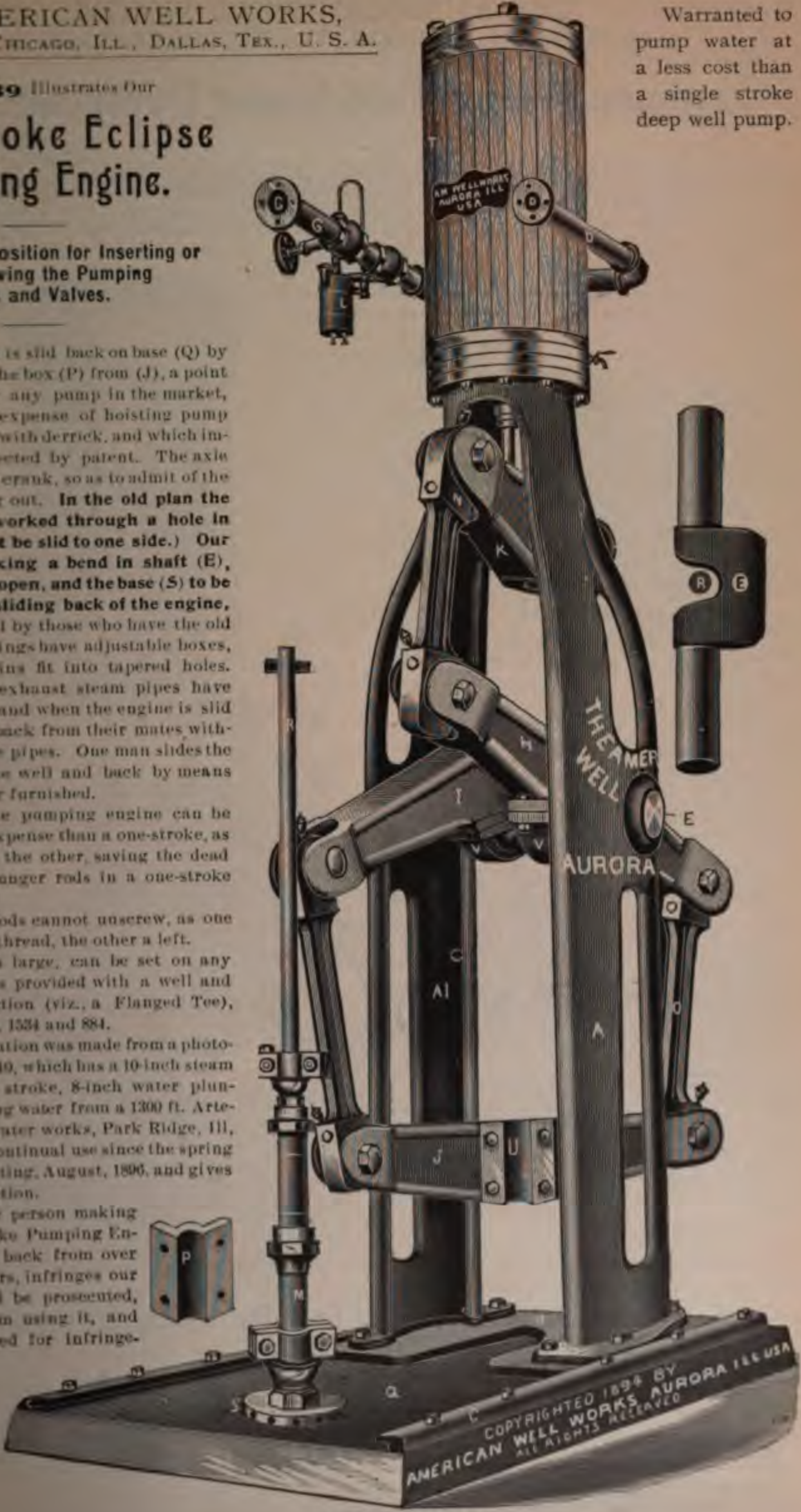


FIG. 1539.

Continuous Flow Two-Stroke Pumping Engin

Fig. 1710 is made from a photograph of one of our patent continuous flow deep well power pump gines for raising more water from a deep well than can be raised by single stroke power pumping engine.

It is substantially built to stand the severe duty incident to pumping water from deep wells into pipes or elevated tanks. It has cut gearing, steel driving pinion, friction clutch balance wheel pulley for ing and stopping.

The water packing tee-head rests on the cast bed in center supporting a water cylinder (Fig. 1581) and pipe in well.

The pump rods are balanced in well, one being solid and inside of the outer hollow rod (See Fig. 1582). The inside rod is coupled with long hardened steel left hand couplings; the outer one with right hand couplings, so that with lock in the upper plunger valve shown in Fig. 1581, rods cannot unscrew in well.

The rods are brass where they pass through packing boxes. The rods and valves are actuated by eccentric gears so constructed that when pump is running one plunger valve is lifting *at all times* producing a continuous motion of water column and a continuous flow, saving the power necessary to start the column of water which in other pumping engines has come to rest between strokes, and saving the shock on valves and working parts.

Too much cannot be said of the advantages of this pumping engine. It's steady even running, free from shocks and strains incident to deep well pumping, is unexcelled by other pumping engines.

This engine is all above foundation where it may be seen and oiled by engineer without climbing down into a dirty pit in foundation constructed at expense of purchaser and which often costs as much as the engine. Oiling would be neglected and engine would wear out quicker if below engine room.

A spool, shaft and gear is provided for drawing out plungers for repacking. This is done by slipping out cross-heads, placing a pulley above well over which rope is run, and taking a turn around spool.

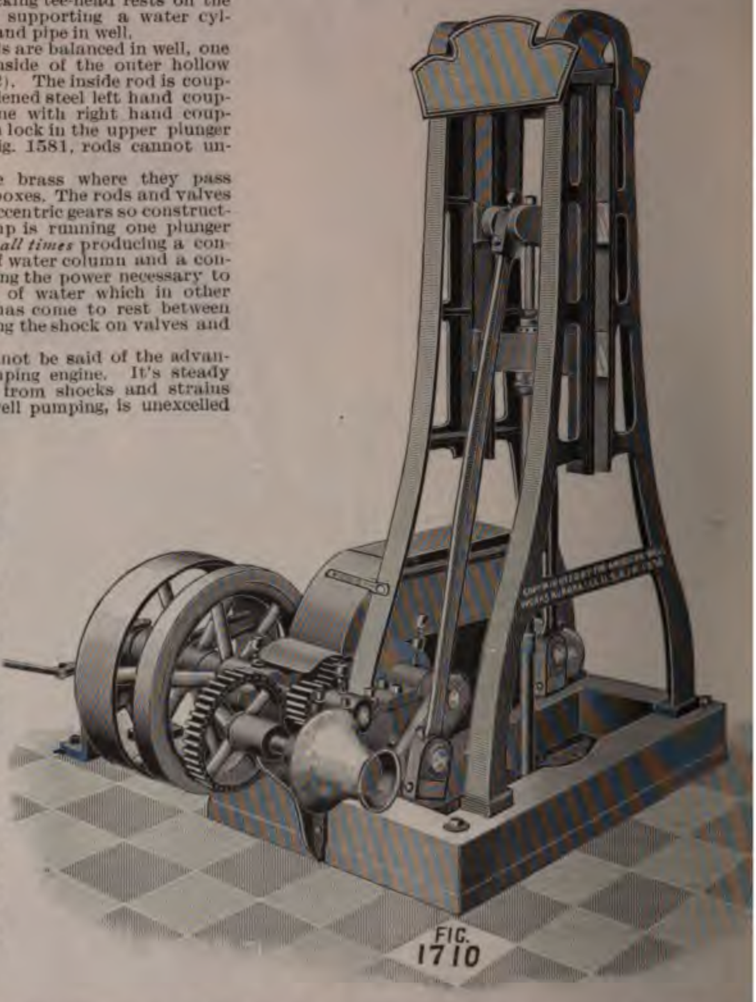


FIG. 1710

We furnish with engine complete: 1 Air Chamber, 1 Discharge Check Valve (screwed), 2 Discharge

List Prices for Fig. 1710 Pumping Engine.

No.	Stroke Inches	Well pipe screws to	Discharge pipe	Geared	Pulley, Double Belt		Code	
					Diam.	Face		
1	18	6	6	5 to 1	24 to 36	5 to 10	Pabe	$1
2	24	10	10	10 to 1	30 to 36	8 to 12	Pabia	1,

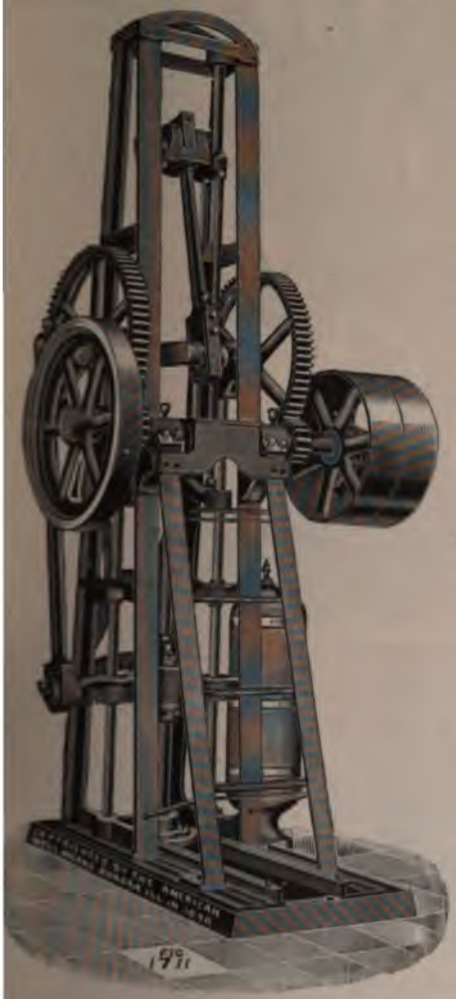
We will fit these engines to attach to smaller well pipe at same price or larger pipes when practic slight additional cost. Discharge is made next smaller size than two-thirds diameter of well pipe used.

wo-Stroke Power Pumping Engine.

g. 1711, made from a photograph, shows our heavy two-stroke power pumping engine for g deep wells from which it is desired to obtain more water than can be pumped with a single ed pump.

operates two plunger rods, one working inside of the other. It has forged steel crank, cut . ample balance wheel, brass plunger rods through packing boxes, heavy bed plate, and tight se pulley for stopping and starting without stopping the power.

is pumping engine operates our 2-stroke working barrel, Fig. 1581, raising one plunger valve ame time the other is lowered. This action produes practically a continuous discharge and raises approximately twice the quantity of water which a single acting water cylinder of same size will raise under like conditions. This also overcomes the difficulty of the water column stopping between strokes as encountered in single acting pumps.



The two-stroke rods used with this engine balance one another in operation, one going down when other rises. They are made non-detachable and cannot come unscrewed in the well, by reason of the inner rod having a left and the outer a right hand thread which securely locks one another. See Fig. 1582 for further description. The inner rod is solid and is coupled with long turned hardened steel couplings.

Our driving gear being in the body of the frame, enables us to build an engine having greater rigidity than can be made by placing the gear on top. The load in this manner is divided.

This pumping engine often saves the expense of sinking a second well by increasing the output of one well to the desired quantity.

It may be driven by gasoline engine, from a line shaft pulley, or from other convenient source of power.

For re-packing plunger valves or removing the rods and valves from the well, loosen the bolts holding top to bed casting, disconnect pump rods from cross-heads and slide top forward out of way on bed plate. (See Fig. 1539.)

We omit tight and loose pulleys and fit with friction clutch pulley complete for **5 per cent.** net additional.

We furnish the engine complete as shown including

1 Air Chamber.
1 Discharge Check Valve (screwed).
2 Discharge Nipples.
1 Set Oil Cups.

Price Fig. 1711. Two Stroke Pumping Engine.

Stroke	Pipe Screws to	Discharge Pipe.	Weight	Geared	Pulleys Double Belt		Code	Price.
					Diam.	Face		
24 in.	6 in.	6	3700	8 to 1	12 to 18	3 to 5	Pabca	**$700**
24 in.	10 in.	10	6000	10 to 1	18 to 30	5 to 6	Pabul	**1250**

e will furnish these engines with shorter stroke for deeper work when desired at same price. ll also fit them for smaller well *pipe* when ordered.

Heavy Deep Well Power Pumping He

Fig. 21 illustrates our Double Geared Deed Well Power Pumping Head with its tee head s on well pipe of a tubular well ready to run. It is strongly built for heavy deep well pumpin gears and steel pinions are machine cut to run smoothly and quietly. A heavy balance whe vents uneven running and sudden belt strains. The larger sizes are geared 8 to 1 and c balanced,— a marked improvement over other makes geared low and with jerky motion re heavy belts. The double gears transmit power to load equally from both sides of crank preventing cramping. Sizes for 4 inch pipe and larger fitted with differential plunger when required for discharging a part on down stroke. Tight and loose pulleys are provided. For repacking plunger valve, slide head back on its

bed plate, then d plunger valve. for drawing plung can be fitted to If water is to be above power hea discharge check and air chamber. power pumping siutable for p any kind of dee and may be dr belt from any of power.

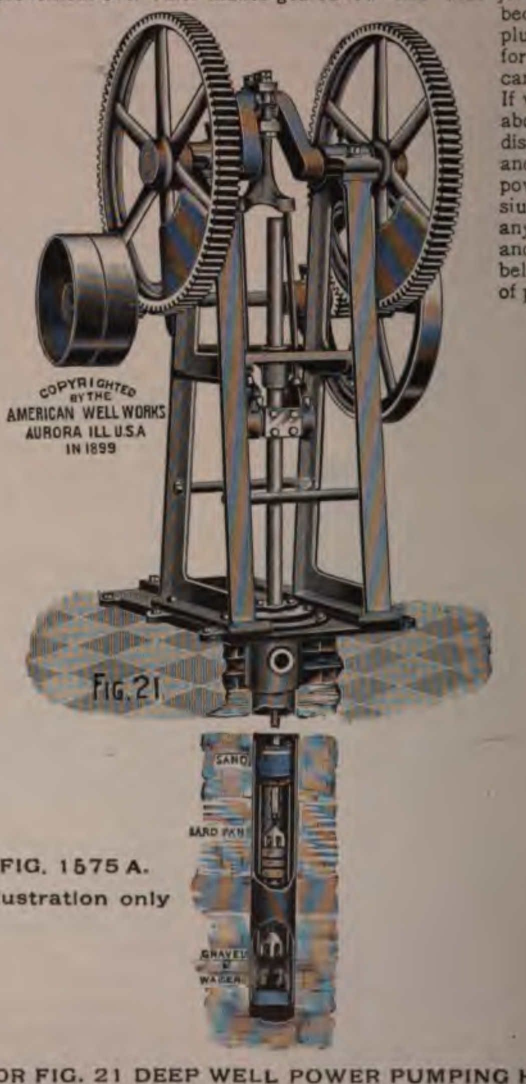

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FIG. 21
SAND
HARD PAN
GRAVEL & WATER

FIG. 1575 A.
Illustration only

PRICES FOR FIG. 21 DEEP WELL POWER PUMPING HEAD.

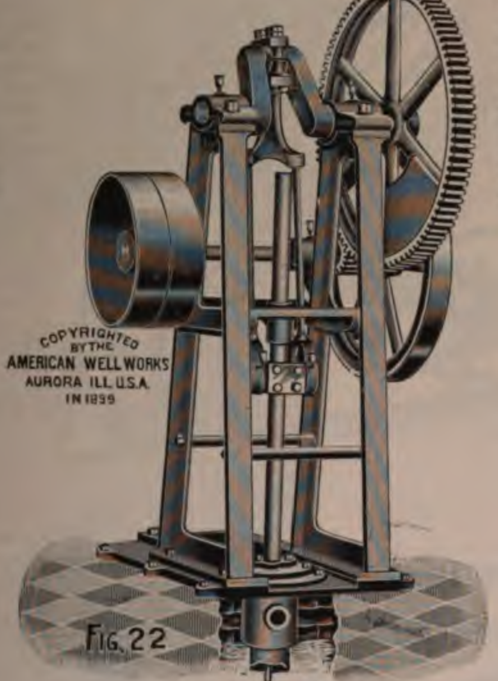
Air Chamber. Discharge Check Valve and Water Cylinder not included in

NO.	Size pipe bottom tapped for	Stroke.	Geared	Rev. per Min.	Pulleys.		Total Lifts varying with size Cyl.	Provide H. P. Avg. full load.	Code.	PR
					Diam	Face				
2	6 to 2	12	5 to 1	30 to 60	20	3½	60 to 550	2½	Pax	
3	6 " 2½	16	5 " 1	30 " 60	20	6	170 " 750	6	Pex	
4	6 " 4	16	8 " 1	30 " 60	20	6	150 " 600	8	Pix	
5	10 " 5	24	8 " 1	25 " 45	30	10	165 " 650	16	Pox	
6*	13 " 7	24	8 " 1	25 " 45	36	10	190 " 700	33	Pux	

*No 6 is built only in a modified form. Stock sizes tapped for largest pipe mentioned.

Deep Well Power Pumping Head.

ig. 22 illustrates our Single Geared Deep Well Power Pumping Head with T head screwed to ipe of a tubular well, ready to run. It is strongly built for deep well pumping. It has moulded, chine cut gears, as preferred. A heavy balance wheel on sizes larger than No. 1 removes n running and sudden belt strains. The larger sizes are geared 8 to 1 and counterbalanced—a ed improvement ther makes geared d requiring heavy Sizes for 4 inch and larger fitted ifferential plunger required for dis- ng a part on down Tight and loose are provided. packing plunger slide the head on its cast bed plate, then draw up the plunger valve A spool for drawing plunger rods can be fitted to shaft. This pumping head is suitable for pumping any style of deep well. If water is to be forced above power head, order discharge check valve and air chamber.


COPYRIGHTED BY THE AMERICAN WELL WORKS AURORA ILL. U.S.A. IN 1899
FIG. 22

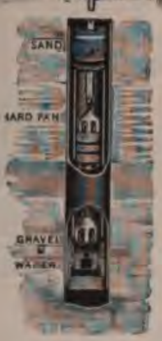


FIG. 1575 A
Illustration only.

PRICES FIG. 22, DEEP WELL POWER PUMPING HEAD.
arge Check Valve, Air Chamber, and Water Cylinder not included in price.

ize Pipe bottom pped for,	Stroke.	Geared	Rev. per Min.	Pulleys.		Total Lift varying with Diam. Cyl.	Provide H. P. avg. full load.	Code.		Prices	
				Diam	Face			Moul'd Gears.	Cut Gears.	Moul'd Gears.	Cut Gears.
4 to 2	8	5 to 1	30 to 70	12	3	50 to 300	1	Pat	Pad	$ 40.	$ 50.
6 " 2	12	5 " 1	30 " 60	20	3½	50 " 500	2	Pet	Ped	100.	120.
6 " 2½	16	5 " 1	30 " 60	20	6	150 " 700	5	Pit	Pid	160.	180.
8 " 4	16	8 " 1	25 " 45	20	6	120 " 600	7	Pot	Pod	210.	230.

1 has no balance *wheel. If rod pulling* spool wanted, add 6%, but none to be less than $6.00 net.

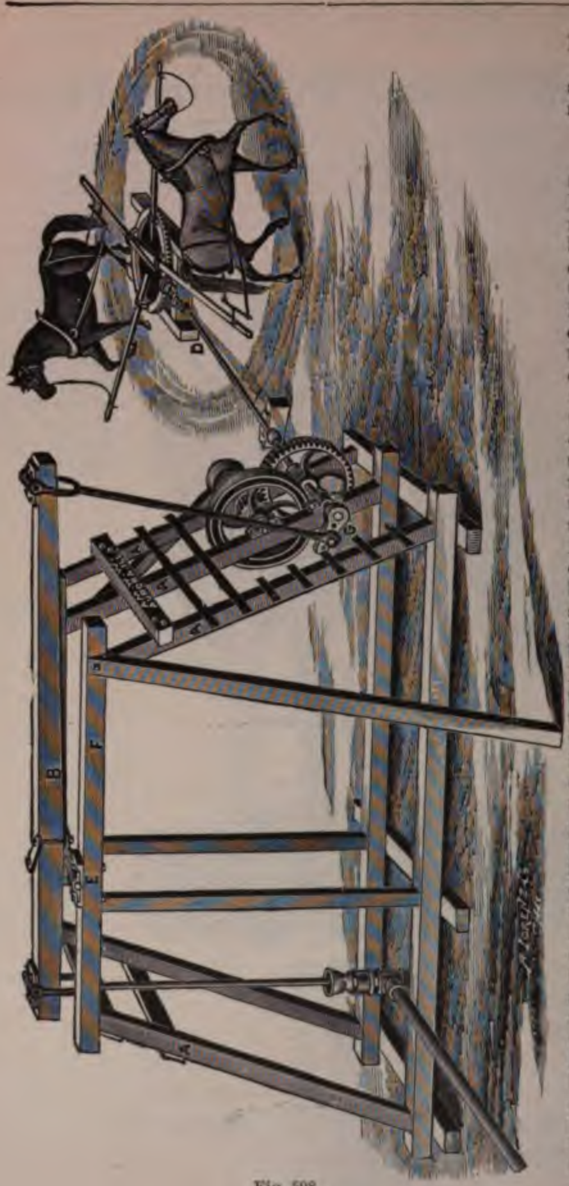


Fig. 598.

Fig. 598 is a Texas
Pump.

This arrangement consi
a Derrick, Pumping ⁄ pp
and Horse Power.

DESCRIPTION.

A is the Derrick, and
the Rest, and B the Wa
Beam, and G is the Crank.
motion is given to the app
by the Horse Power (D),
communicates power t
Crank (G) and causes the
ing Beam (B) to work u
down, and it accordingly
the Pump Rods. The pe
construction of this device
very simple that it is calc
that the farmer or any carp
can erect it. The adjustm
the Walking Beam bearin
the Fulcrum Beam (F) is
that by moving the Fulcr
the Walking Beam, and o
Pitman Bearing (F), the l
of the stroke of the Pump
be adjusted for a long or
stroke or to pump slow or
ly, as may be desired. It
be noticed that the Wa
Beam connection is place
the outside of the Beam,
there are no holes bored in
weaken it in fastening the
ings in position. A si
device is used on the Ful
timbers. We ship this all
plete, as shown in the pictu
ready to erect, or will shi
iron work on a frame, so t
can be bolted onto a Derr
this or any other constru
At great distances in fo
countries we should recom
the furnishing of the mach
and horse power, and ge
wood work for Derrick e
there. We will furnish all
how to build it, the size of
bers, etc., to the purchase
rig. We also fit this to b
by a steam engine, havi
large driving pulley. The
balance wheel shown he
made to be used as a band
so that it can be used in sawing wood or driving machinery, as required

Number of Machine	1	2	4	8	12
Number of Horse Power	1	2	4	8	12
Prices complete as shown in picture, with Horse Power and Derrick	$	$130 00	$165 00	$220 00	
Price complete for Pumping Apparatus, as shown in picture, without Horse Power		95 00	115 00	140 00	
Prices for Rig complete with Steam Pulley, so that it may be driven with a steam engine		100 00	125 00	155 00	
Price of Pumping Apparatus without Horse Power or Wood Work		75 00	90 00	110 00	
Price for Horse Power and Machinery without Wood Work. Bolts furnished		110 00	140 00	180 00	

When we mention Horse Power, we include the Sweeps and Leap-Poles. It would not be p
to ship Power unless complete; but the Derrick is so simple that it can be erected by any one
nary intelligence. Pump and Stuffing Box not included in prices. Patent applied for.

THE AMERICAN PUMPING JACK.

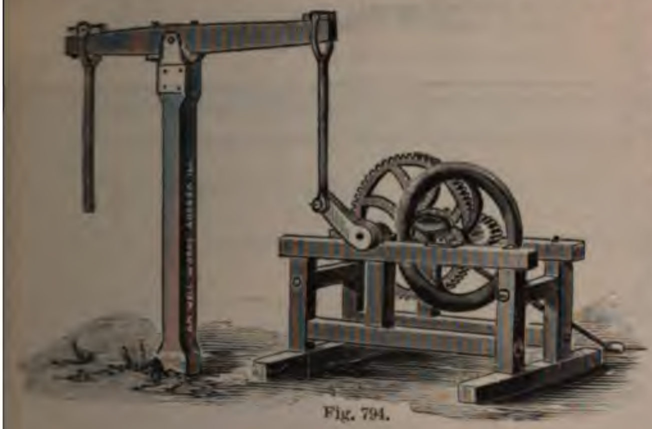

AM. WELL WORKS AURORA ILL

Fig. 794.

Fig. 794, The American Pumping Jack, as shown here, is furnished with frame work and Walking Beam connections as shown, and is suitable for pumping from deep wells, and can be used with Horse or Steam Power.

The Pump is not included in the prices, but connections for Pump Rods are furnished.

THE ARKANSAS PUMPING JACK.

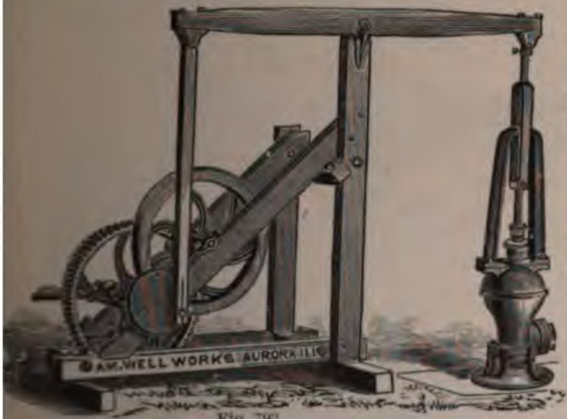

AM. WELL WORKS AURORA ILL

Fig. 793.

Fig. 793.—The Arkansas Pumping Jack is furnished with a Walking Beam and Stirrup Connections, Balance Gearing in Frame as shown.

If you should not wish the Walking Beam and Post, we will deduct the price if so ordered.

It is suitable for pumping deep wells by Horse or Steam Power.

AMERICAN PUMPING JACKS.	Price of Pumping Jacks, as shown in picture, fitted for Horse-Power.	Price of Pumping Jacks, as shown in picture, with a Sprocket or Pully, to be driven with steam power.	Price of Pumping Jacks, with Horse-Power and two Tumbling Rods, all complete.	Depth of well, in feet it is suitable to pump with a 1½-inch stroke and a 2-inch Cylinder.	Depth of well it will pump, using a 4-inch Cylinder and a 12 inch stroke.
Fig. 793 and 794, Pump not included, suitable for 1 Horse-Power	$35 00	$40 00	$65 00	100	25
" " " " " " " " " 2 " "	45 00	50 00	90 00	200	50
" " " " " " " " " 4 " "	55 00	60 00	110 00	400	100

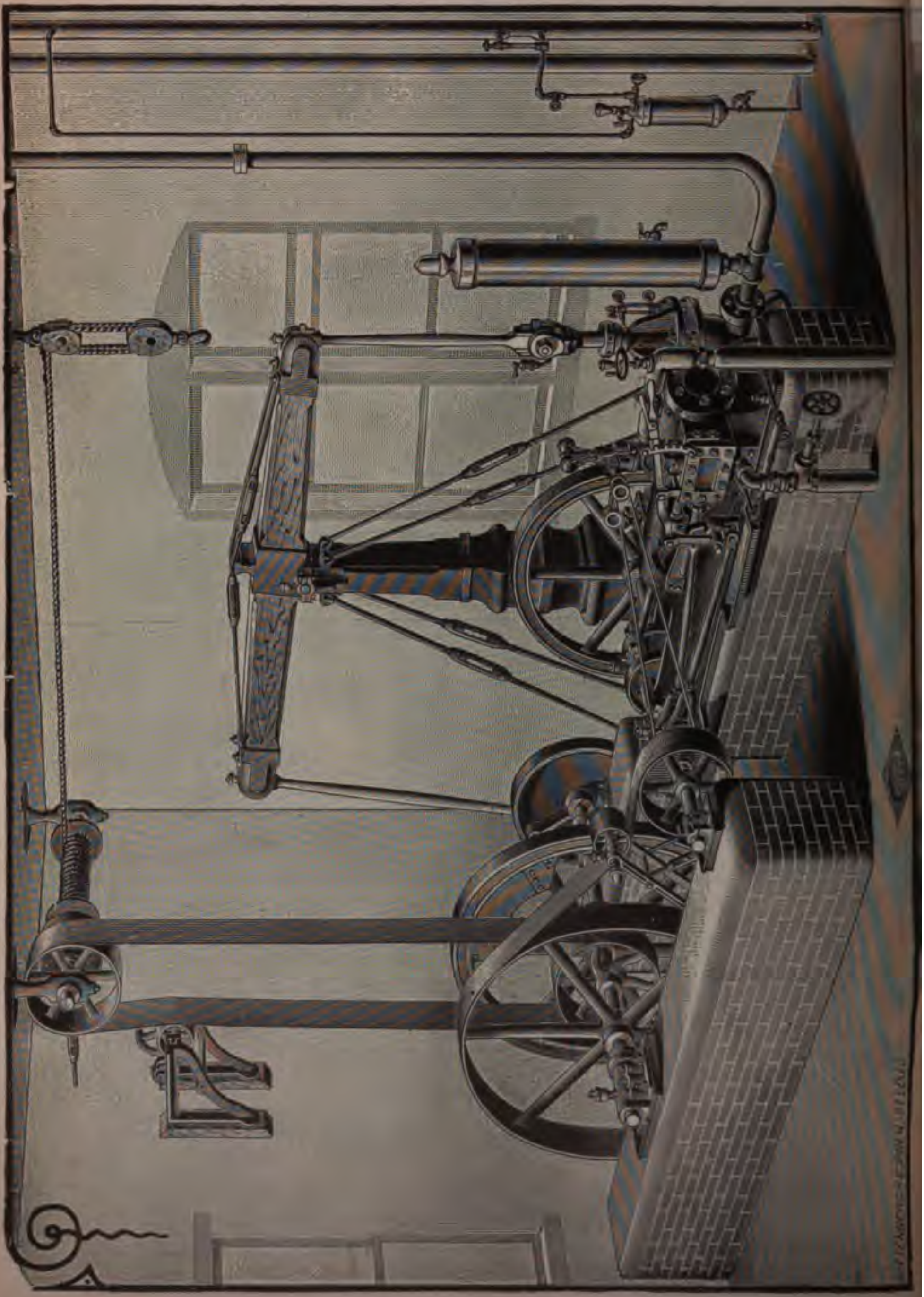
The capacity given is a low estimate.

We can furnish Tread Powers for driving these Pumps, but it is cruel to use imal that way.

Fig. 1358. American Walking Beam Pumping Plant, for Pumping Deep and Non-Flowing Artesian Wells.

This picture is a view of our deep well Walking Beam Pumping Outfits, connected up, showing a hoisting gear for hoisting the pump rods out of the well when needed for repairs. The picture is not exactly like the hook-up would be, but it conveys a general idea. It is suitable for pumping a well to the depth of 2,000 feet. This the regular oil well engines is used, but a more economical form would be the compound engine. Either can be used, as seems the most prudent. If fuel is expensive, a compound engine should be used. Large numbers of these rigs are in constant use. They can be fitted ornamentally for the engine room as an object of beauty or made plain and substantial.

Prices will be given on application, after getting sufficient data.



p Well Force Discharge Heads, for Use in Pumping water and Oil Wells.

. 979.

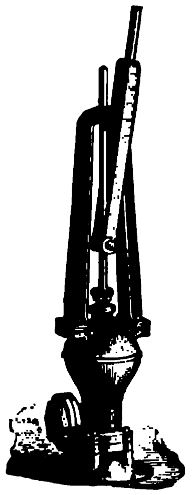


Fig. 235.

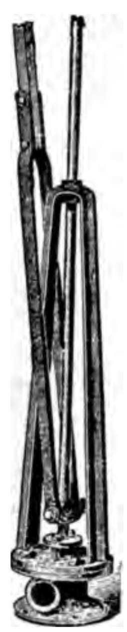


Fig. 881.

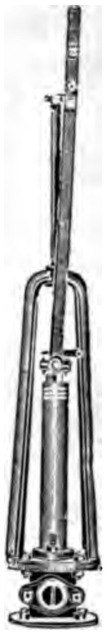


Fig. 882.

These heads are made to be connected to the top of a pipe that is connected to a pumping cylinder any nce down a well. Each has a packing box, a rod guide, and a stub for connecting to rod for connecting walking beam, crank or vertical motion power.

Fig. 979, windmill pattern, has no outlet. Tee must be used in pipe below.

Fig. 882 has brass plunger for forcing the water above the outlet by the down stroke. Air chamber ld be used in delivery pipe if water is to be delivered at a great distance or at an elevation.

LIST PRICES OF DEEP WELL PACKING HEADS.

(All sizes in inches.)	Size Pipe Head screws to.	Discharge Pipe fitted for.	Diameter polished steel or brass rod.	Fig. 517 W. R. Coupling threaded for.	With polished steel rod, 12 inch stroke.	With brass rod, 12 inch stroke.	With polished steel rod, 24 inch stroke.	With brass rod, 24 inch stroke.	With polished steel rod, 36 inch stroke.	With brass rod, 36 inch stroke.
881.	3	3	1⅛	¾ Pin W. R. Coupling.	$21.00	$25.00	$27.00	$31.50	$33.00	$41.50
"	3½	3½	1⅛	⅞ " "	22.50	26.50	28.50	36.00	34.50	45.75
"	4	4	1⅛	1⅛ " "	25.25	29.00	31.50	39.00	38.25	49.50
"	4½	4½	1⅛	1⅛ " "	26.25	30.00	34.50	42.00	42.75	54.00
"	5	5	1¼	1¼ " "	28.50	33.00	37.50	45.50	46.50	57.00
"	6	6	1⅛	1⅜ " "	31.50	36.00	42.00	50.00	52.50	60.00
"	6	6	1½	1½ " "	......	......	47.00	60.00	59.00	73.00
"	7	7	1½	1½ " "	......	......	50.70	63.50	62.50	76.50
"	8	8	1½	1½ " "	......	......	54.00	67.00	66.00	80.00
Fig. 979.	3	3	1⅛	¾ " "	14.00	16.00	18.00	23.00	22.00	29.50
"	3½	3½	1⅛	⅞ " "	15.00	17.00	19.00	24.00	23.00	30.50
"	4	4	1⅛	1⅛ " "	16.50	19.50	21.00	26.00	25.50	33.00
"	4½	4½	1⅛	1⅛ " "	17.50	20.00	23.00	28.00	28.50	36.00
"	5	5	1⅛	1¼ " "	19.00	22.00	25.00	31.00	31.00	38.00
"	6	6	1⅛	1¼ " "	21.00	24.00	28.00	33.50	35.00	40.00
Fig. 882.	3	3	.....	⅞ " "	26.25	31.50	33.75	43.00	41.00	55.00
"	3½	3½	.....	⅞ " "	28.00	33.00	35.00	45.00	43.00	57.00
"	4	4	.....	1⅛ " "	31.75	36.00	39.00	48.50	48.00	61.50
"	4½	4½	.....	1⅛ " "	33.00	37.50	43.00	52.50	53.00	67.50
"	5	5	......	1¼ " "	35.00	41.50	47.00	57.00	58.00	70.00
"	6	6	......	1¼ " "	39.00	45.00	52.50	62.50	66.00	74.00
"	7	7	.....	1½ " "	..	...	63.00	78.00	76.00	92.00
"	8	8		1½ " "			67.00	82.00	80.00	96.00

Stuffing Boxes and Artesian Well Working Heads.

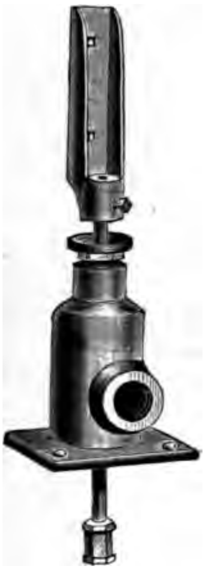


Fig. 640.

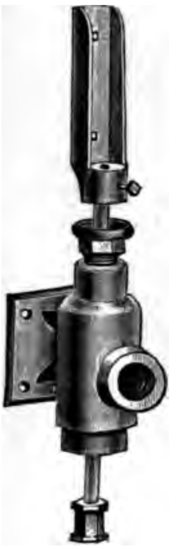


Fig. 539.

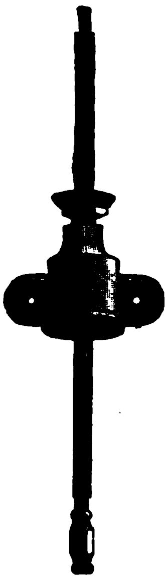


Fig. 977.

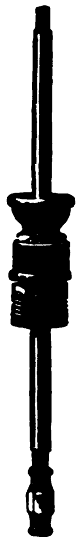


Fig. 978.

Figs. 539 and 540 are for shallow wells or light duty.
Figs. 977 and 978, for deep well and heavy duty, as well as light.
Discharge of Figs. 977 and 978 is made by a Tee in discharge pipe and is not included.
All are made with iron bodies with brass packing nuts except 1¼ inch and smaller of Fig. 978 which brass glands.

(All Sizes in inches.)	Size Pipe bottom screws to.	Discharge Pipe fitted for.	Diam. Polished Steel or Brass Rod.	Rod threaded both ends. (Figs. 539 and 540 one end.) For wood and steel rod couplings.	Prices with polished steel rod; 10 inch stroke.	Price with brass rod; 10 inch stroke.	Price with polished steel rod; 12 inch stroke.	Price with brass rod; 12 inch stroke.	Price with polished steel rod; 24 inch stroke.	Price with brass rod; 24 inch stroke.	Price with polished steel rod; 36 inch stroke.
Fig. 539 & 540.	1¼	1¼	½	⅝ Steel Rod Coupling.	$ 4.75	$ 5.75	$ 5.00	$ 5.80	......	......	......
" "	1½	1½	½	⅝ " " "	5.25	6.25	5.50	6.25	......	......	......
" "	2	2	9-16	½ " " "	5.60	6.80	6.00	7.00	......	......	......
" "	2½	2½	⅝	⅝ Pin W. R. Coupling.	6.40	7.50	6.90	8.00	......	......	......
" "	3	3	⅞	⅞ " " "	7.20	8.70	7.80	9.50	......	......	......
" "	3½	3½	⅞	⅞ " " "	......	......	8.60	10.30	......	......	......
" "	4	4	1⅛	1⅛ " " "	......	......	9.80	12.50	......	......	......
Fig. 977.	1	1	½	⅝ Steel Rod Coupling.	2.30	3.00	2.50	3.25	......	......	......
"	1¼	1¼	½	⅝ " " "	2.30	3.00	2.50	3.25	......	......	......
"	1½	1½	½	⅝ " " "	2.40	3.15	2.60	3.35	......	......	......
"	2	2	9-16	½ " " "	2.75	3.75	3.00	4.00	......	......	......
"	2½	2½	⅝	⅝ Pin W. R. Coupling.	3.10	4.20	3.40	4.50	......	......	......
"	3	3	⅞	⅞ " " "	......	......	4.00	5.70	......	......	......
Fig. 978.	1	......	½	⅝ Steel Rod Coupling.	3.30	4.00	3.50	4.30	......	......	......
"	1¼	......	½	⅝ " " "	3.30	4.00	3.50	4.30	......	......	......
"	1½	......	½	⅝ " " "	3.40	4.20	3.60	4.40	......	......	......
"	2	......	9-16	½ " " "	3.75	4.75	4.00	5.00	......	......	......
"	2½	......	⅝	⅝ Pin W. R. Coupling.	4.10	5.20	4.40	5.50	......	......	......
"	3	......	⅞	⅞ " " "	4.70	6.40	5.00	6.70	......	......	......
"	3½	......	⅞	⅞ " " "	......	......	5.40	7.10	$ 8.50	$10.90	......
"	4	......	1⅛	1⅛ " " "	......	......	6.25	8.90	9.25	11.80	$12.30
"	4½	......	1⅛	1⅛ " " "	......	......	7.00	9.65	10.20	12.80	13.25
"	5	......	1⅛	1⅛ " " "	......	......	7.75	10.40	11.25	13.90	14.30
"	6	......	1⅛	1⅛ " " "	......	......	8.75	11.40	12.50	15.10	15.60
"	6	......	1½	1⅛ " " "	......	......	11.00	14.00	15.00	21.00	18.25

Air Chambers, Discharge Check Valves.

Fig. 36 illustrates our Improve Discharge Check Valve for use in discharge pipe of any water pumping plant. It may be set horizontally or vertically as perferred and works perfectly in either position.

Fig. 37 illustrates Fig. 36 combined with an air chamber, and which is used with our deep well pumping heads and engines, and saves the purchaser the expense of connecting fittings required when they are separate.

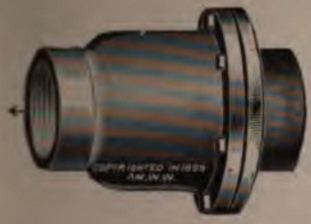


Fig. 36.

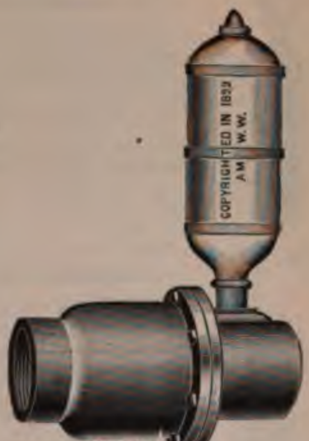


FIG. 37

PRICES, FIGS. 36 AND 37, DISCHARGE CHECK VALVES.

Discharge pipe for, inches	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8
Tap for air chamber Fig. 37 only, inches		¾	1	1	1¼	1½	1½	2	2	2½	2½	3	3
Price, Fig. 36	$.90	$1 10	$1.50	$1.90	$2.60	$3 75	$5.50	$7 00	$9.50	$11.50	$15.	$17.	$20.
" " **37**		3.25	5 50	5.90	8.50	10.50	12 00	16 50	18.75	23.50	27.	34	37.

PRICES OF CAST IRON AIR CHAMBERS FOR DISCHARGE PIPES.

Outside Diameter, inches	5½	8	6	9	10	11	15
Height "	9	12	20	18	19	24	24
Tap "	¾	1	1¼	1½	2	2½	3
Price, Cast Iron Air Chambers	$1.75	$3.50	$5.75	$6.25	$8.50	$11.00	$14.50

PRICES, FIG. 1657 WROUGHT BODY HIGH LIFT AIR CHAMBERS.

Lift suited for	125 Feet.			200 Feet*		
Inside Diam. Body, inches	4½	6	8	4½	6	8
Length over all, feet	4	4	4	6	6	6
Pipe tap, inches	1½	2	2½	1½	2	2½
Fig. 1657 Air Chamber	**$7.00**	**$10.00**	**$13.00**	**$10.00**	**$13.00**	**$17.00**

Fig. 1657.

*For higher lifts, increase length of chamber.

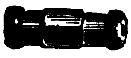


Fig. 151.

Wood and Steel Pump or Sucker Rods and lings for Use in Pumping.

Fig. 151 illustrates our malleable and brass solid rod couplings
Fig. 49 illustrates our malleable iron wood rod couplings.
Fig. 517 illustrates our wrought iron wood rod couplings with strai

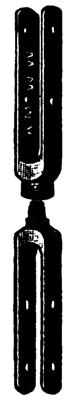


Fig. 49.

List Prices Galv. Solid Steel Pump Rods and Fig. 151 Malleable

Size Rods and Couplings, inches	⅜	7-16
Price per 100 Ft. Galv. Random Lengths, not threaded	$5.80	$ 6.20
" " " " " coupled	6.50	7.20
Price per 100 Galv. Rod Sockets, **Fig. 151**	4.20	4.50
" " 25 " " " "	1.25	1.35
" " 10 " " " "	.55	.60
Price per 100 Brass Rod Sockets, **Fig. 151**	9.00	10.00
" " 25 " " " "	2.75	2.90
" " 10 " " " "	1.10	1.25

Malleable Fig. 49 and Wrought Iron Fig. 517 Wood Rod Coup

Fig. 49, Malleables have pipe thread.	Size Pin.	Size Rods suitable for.	Price per Pair.	List prices for singl	
				10 Pairs.*	25 Pairs.*
Malleable 2 Hole Plain	⅜	1 to 1⅛	$ .14	$ 1.30	$ 3.15
" 2 " Galv.	⅜	1 " 1⅛	.16	1.55	3.75
" 3 " Plain	⅜	1 " 1⅛	.17	1.65	4.00
" 3 " Galv.	⅜	1 " 1⅛	.20	1.90	4.40
" 3 " Plain	½	1 " 1¼	.20	1.95	4.75
" 3 " Galv.	½	1 " 1¼	.24	2.30	5.50
" 3 " Plain	¾	1½ " 2	.30	2.80	6.60
" 3 " Galv.	¾	1½ " 2	.36	3.40	8.10
Wrought Iron, **Fig. 517**	⅝	1 " 1¼	.60	5.70	13.75
" " "	⅞	1½ " 2	.75	7.25	16.00
" " "	1⅛	2 " 2½	1.75	17.00	41.50
" " "	1½	2½ " 3½	3.40	33.00	80.00
" " "	2	3½ " 4	5.30	25.00	127.50

Norway Iron Rivets for couplings, per pound, **12 cents.**
*Rivets are included in 25 pair and smaller lots, but not in larger lo

List Prices per 100 Ft. of Octagonal or Square Wood Rods Co Uncoupled in Random Lengths.

Size of Wood Rods in inches		1	1⅛	1¼	1½	1⅝	2	2¼	2½	3
Price Ash Wood Rods.	Kind and size Pin Coupling used.									
Not Coupled		$2.00	$2.60	$3.00	$4.00	$5.00	$7.00	$9.00	$11.00	$15.00
Coupled	⅜ Mall. Gal. 2 Hole	4.00	5.00							
"	⅜ " 3 "	4.50	5.50							
"	½ " 3 "	4.75	5.75	6.50						
"	¾ " 3 "				8.30	9.50	11.60			
"	⅝ Wro't. Fig. 517	7.75	8.50	9.00						
"	⅞ " " "				11.00	13.00	15.00			
"	1⅛ " " "						25.00	27.00	30.00	
"	1½ " " "								46.50	51.50
"	2 " " "									
Price Sq're Hard Pine.										
Not Coupled		1.50	2.00	2.25	3.00	3.75				
Coupled	⅜ Mall. Gal. 2 Hole	3.50	4.20							
"	⅜ " " 3 "	4.00	4.60							
"	½ " " 3 "	4.25	4.75	5.75						
"	¾ " " 3 "				7.30	8.25				

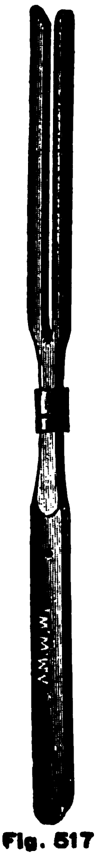


Fig. 517.

Sucker or Wood Rods.

Made extra long octagonal or square for pumping deep wells. For regular lengths see previous page.

They are made extra long (21 to 29 feet) by splicing two poles together with concave wrought iron straps (like Fig. 1648) riveted and then using Fig. 517 wrought iron couplings on ends. This produces a first-class wood rod at a low cost and less joints to unscrew when drawing out rods to releather plunger.

Size of Wood Rods in inches	Kind and size Wrought Coupling used.	2	2¼	2½	3	3½	4
Price per 100 feet coupled, alternate joints being straps similar to Fig. 1648.	⅞ Wrought **Fig. 517,**	$13.50	$.....	$.....	$.....	$.....	$.....
" " " "	1⅛ " " "	22.50	24.00	27 00	.....	....	.....
" " " "	1½ " " "	.....	. ...	40.00	45.50	50.00	.....
" " " .	2 " " "	.....	.....	. ...	.....	.....	70.00

Fig. 1261 is a rivet catcher used in deep well pumping to catch any rivets. nuts or other things dropped down the well and prevent them from wedging on plunger valve. Its use occasionally saves many times its cost in avoiding pulling out working barrels to get out obstructions. It is used next above the working barrel and screws into the line of plunger rods.

Wood Rod Couplings (Fig. 517) It fits	⅝	⅞	1⅛	1½	2
Price Fig. 1261*	$2.25	$3.00	$4.50	$6 00	$8.00

*State in ordering, the diameter of water pipe it is to be used in.

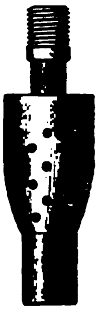


Fig. 1261.

Fig. 1649 illustrates our **Hoisting Swivel made for taking wood rods** out of wells to repack plunger valves. Special threads and sizes will be made to order on receipt of templet and a deposit with order.

Price Fig. 1649, connects to ⅝-in. Pin. Fig. 517 Coupling	**$1.80**
" " " " " ⅞ " " " " "	**2.50**
" " " " " 1⅛ " " " " "	**3.60**
" " " " " 1½ " " " " "	**4.60**
" " " " " 2 " " " " "	**6.80**

Fig. 1656 is our **Sucker Rod Wrench** used in uncoupling Fig. 517 Wood Rod Couplings when taking out plunger valve. It has a lug on back so careless workmen cannot drop it down the well pipe. Two wrenches should be used.

Price Fig. 1656, to fit ⅝-in. Pin, Fig. 517 Coupling.	**Malleable** ...	**$0.35**
" " " " " ⅞ " " " " "	" ...	**.60**
" " " " " 1⅛ " " " " "	"	**.70**
" " " " " 1½ " " " " "	**Wrought**	**2.00**
" " " " " 2 " " " " "	" ...	**2.80**

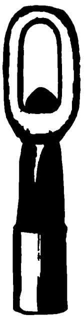


Fig. 1649.

Standard Deep Well Water Cylinde

Fig. 1382 shows water end of a deep well pump; is supported by an iron discharge pipe. In turn is attached to base of operating engine or appliances at surface.

The cylinder, sizes 5¾ inches and smaller are made from *heavy* seamless brass tubing; and larger of cast bronze, bored turned and polished smooth inside; all valves are bronze, heavy with spherical balls; water plunger is packed with leather cups making them capable standing long and heavy duty incident to deep well pumping, without giving out as do the light weight cylinders, and flat valves on the market. These cylinders are capable of liftin from any depth and wear for years.

The inside of cylinders is of smaller diameter than discharge pipe, to permit of easy valves for repacking without taking up cylinder. *If water obtained in caving materials, have well ted with screen before putting in pump.* 5¾ inch and smaller plungers, only have bottom bale.

PRICES INCLUDE CYLINDER, VALVES, ROD, TOP AND LOWER COUPL

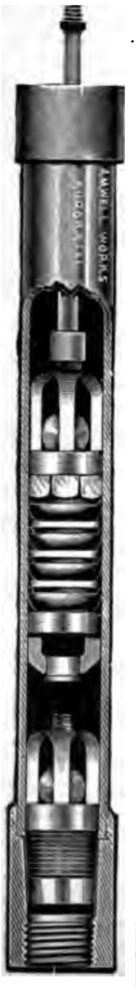


Fig. 1382.

	Inside Diam. In.	Max. Stroke. In.	Length Total In.	Pipe screws to, In.	Bottom Pipe Tap, In.	Pipe goes in, In.	Theo. Gals. Stroke.	Wood Rods, In.	Code.
	1¾	**8**	29¼	2	1¼	3	.08	1 to 1¼	Waba
	2¼	**8**	31	2½	1½	3½	.13	1 " 1⅝	Wacu
	2¾	**8**	31½	3	2	4¼	.20	1⅛ " 1⅝	Wadi
	1¾	**12**	33¾	2	1¼	3	.12	1 " 1¼	Waff
	2¼	**12**	35	2½	1½	3½	.20	1 " 1⅝	Wago
	2¾	**12**	35½	3	2	4¼	.30	1⅛ " 1⅝	Wahr
	1¾	**16**	37¾	2	1¼	3	.16	1 " 1¼	Walt
	2¼	**16**	39	2½	1½	3½	.27	1 " 1⅝	Wamo
	2¾	**16**	39½	3	2	4¼	.41	1⅛ " 1⅝	Wari
	3¼	**16**	40¾	3½	2½	4¾	.57	1½ " 2	Wasl
	3¾	**16**	42¼	4	3	5⅝	.76	1⅝ " 2¼	Wata
	4¼	**16**	43	4½	3½	6	.97	2 " 2½	Wavi
	4¾	**16**	45	5	4	6⅝	1.22	2 " 2½	Waxo
	1¾	**20**	41¾	2	1¼	3	.20	1 " 1¼	Wayo
	2¼	**20**	43	2½	1½	3½	.33	1 " 1⅝	Wael
	2¾	**20**	43½	3	2	4¼	.51	1⅛ " 1⅝	Webe
	1¾	**24**	45¾	2	1¼	3	.25	1 " 1¼	Weda
	2¼	**24**	47	2½	1½	3½	.41	1 " 1⅝	Wefo
	2¾	**24**	47½	3	2	4¼	.61	1⅛ " 1⅝	Weht
	3¼	**24**	48¾	3½	2½	4¾	86	1½ " 2	Weji
	3¾	**24**	50¼	4	3	5⅝	1.15	1⅝ " 2¼	Weko
	4¼	**24**	51¼	4½	3½	6	1.47	2 " 2½	Welu
	4¾	**24**	53	5	4	6⅝	1.84	2 " 2½	Welm
	5¾	**24**	57¾	6	4½	8	2.25	2 " 3	Wenz
	1⅛	**36**	53¼	1¼	¾	2¼	.15	7-16 { Steel	Wept
	1⅜	**36**	53½	1½	1	2½	.23	½ { rods	Werp
	1¾	**36**	57¾	2	1¼	3	.37	1 " 1¼	Weso
	2¼	**36**	59	2½	1½	3½	.62	1 " 1⅝	Wetu
	2¾	**36**	59½	3	2	4¼	.92	1⅛ " 1⅝	Weun
	3¼	**36**	60¾	3½	2½	4¾	1.30	1½ " 2	Wevo
	3¾	**36**	62¼	4	3	5⅝	1.72	1⅝ " 2¼	Wewo
	4¼	**36**	63¼	4½	3½	6	2 21	2 " 2½	Wext
	4¾	**36**	65	5	4	6⅝	2.76	2 " 2½	Wiba
	5¾	**36**	69¼	6	4½	8	3.90	2 " 3	Wice
Heavy Cast Bronze.	**6½**	**36**	72	7	5	9	5 16	2½ " 3½	Widi
	7½	**36**	73	8	6	10	6.9	3 " 4	Wiek
	8	**36**	74	8⅝	......	11⅝	7.8	3 " 4	Wift
	8½	**36**	75	9	7	12	8.9	3 " 4	Wigu
	9½	**36**	78	10	8	13	11 0	3½ " 4	Wilt
	11½	**36**	80	12	10	15	16.2	4 " 5	Wimz
	12½	**36**	80	13	......	17	18.	4 " 5	Wino

Working Barrels for Wells.

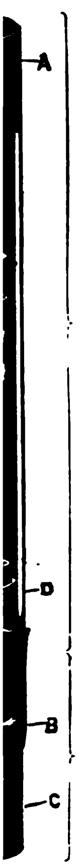


Fig. 861. Does not include packer.

Fig. 866. Does not include Barrel.

Fig. 861 includes only seamless brass barrel, check valve and plunger valve, with valve stem shown. It constitutes a well working barrel for seating in a well pipe or casing by using Fig. 866, gum packer and tube, to make a tight joint with well pipe.

Fig. 865 is plunger valve for Fig. 861 and 862.

Fig. 866 is a gum packer and tube for seating Fig. 861 working barrel. Fig. 866 is supported by a pipe, shoulder in well, or by a screen.

Fig. 869 is check valve for Fig. 861 and 862.

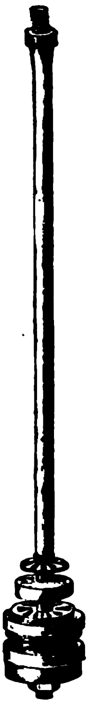


Fig. 865.

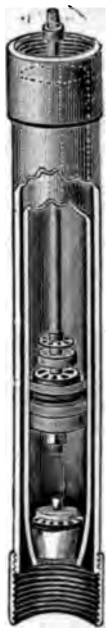


Fig. 862.

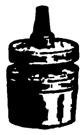


Fig. 869.

PRICES AND SIZES WORKING BARREL AND VALVES.

Price Fig. 861.						Price Fig. 862.				Price Valves only, for Figs. 861 & 862.	
side iam. rrel.	Outside Diam. Barrel.	Strokes.	Price Fig. 861	Price Fig. 861 less Valves.	Price Fig. 866 Packer B & C only.	Size pipe barrel used in.	Inside Diam. Barrel.	Stroke.	Price Fig. 862 complete.	Price Fig. 865.	Price Fig. 869.
2½	2¾	24	$20.	$10.	$2 50	3	2¾	24	$27.	$6.00	$4.50
3	3¼	"	26.	13.	3.25	3½	3¼	"	34.	7.50	6.00
3½	3¾	"	30.	15.	4 00	4	3¾	"	40.	8.50	7.00
4	4¼	"	34.	17.	5.75	4½	4¼	"	45.	10.00	8.00
4½	4¾	"	37.	19.	6.50	5	4¾	"	50.	11.00	9.00
5½	5¾	"	52.	26.	7.50	6	5¾	"	69.	16.00	12.00
2½	2¾	36	24.	13.		3	2¾	36	32.	7.50	6.00
3	3¼	"	30.	16.		3½	3¼	"	40.	9.50	7.50
3½	3¾	"	34.	19.		4	3¾	"	45.	11.00	9.00
4	4¼	"	38.	21.		4½	4¼	"	52.	12.00	10.00
4½	4¾	"	42.	24.		5	4¾	"	56.	14 50	12 00
5½	5¾	"	60.	33.		6	5¾	"	80.	19 00	16 00

ls for 24 inch stroke are 42 inches, and for 36 inch stroke, 54 inches long.

Chapman's Deep Well, Well Bottoms.

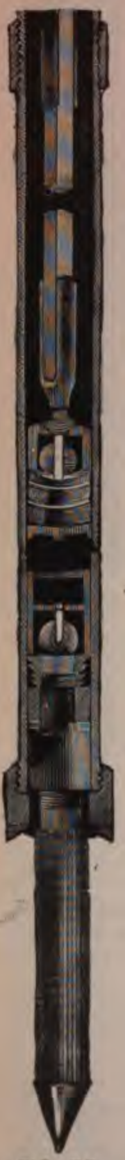


FIG. 75.

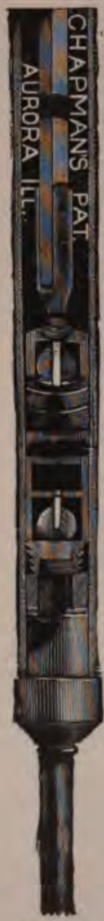


FIG. 18.

Fig. 75 illustrates our Standard Tubular Well, Well Bottom. It includes steel bored cylinder, coupling, shoe, check and plunger valves, rod coupling, screen and reducer for seating check valve. The valves are Chapman's patent tubular well valves. The cylinder screws to the bottom of the well pipe and the well is drilled with tools working through the cylinder. When water is obtained, the screen, reducer, and valves are put in place.

Fig. 18 is similar to Fig. 75 save that instead of shoe at the bottom, a reducer is used permitting a section pipe to attach below with screen at lower end. This cylinder is used by hanging into drilled wells where hole has been reduced and water level falls below the reduction so that small suction pipe is necessary to secure the water. It is also used in dry dug wells by sinking a drive well point in the bottom and attaching Fig. 18 above in well. It includes steel bored cylinder, coupling, reducer, valves, rod coupling, and seating collar for check valve.

Fig. 201 is used in wells with high lift, requiring extra strong valves. It is used for pumping both water and oil. It may be sunk with the well pipe, the same a Fig. 75, or hung into well on pipe. The valve poppets are self grinding, maintaing perfect seats by the action of valves. Fig. 201 includes steel bored cylinder, coupling, valves, rod coupling and shoe.

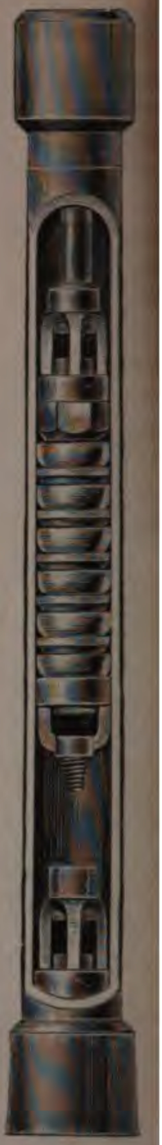


FIG. 201.

PRICES CHAPMAN'S PATENT TUBULAR WELL WELL BOTTOMS.

Size pipe screws to, inches	2	2½	3
FIG. 75, Steel Bored, 4 ft. long, Complete	$ 9.00	$14.00	$20.00
" " " " 3 ft. " "	8.00	12.50	18.00
" " Brass Lined, 4 ft. " "	12.00	18.00	24.00
" 201, Steel Bored, 4 ft. " "	18.00	25.00	36.00
(Add 25 per cent for Brass Lined.)			
" 18, Steel Bored, 2 ft. long, Complete	6.00	9.00	12.00
Steel Bored Cylinders, only, 4 ft. " "	3.50	5.00	6.50
" " " " 2 ft. " "	2.75	3.50	4.50

Brass lining decreases diameter approx. ¼ inch.

. 727 illustrates Chap- Patent Seamless Drawn Cylinder and Valves for at any point below the in the pipe casing of a r well, thus doing away xpense of pipe to hang cylinder, and give a r pumping capacity hung-in cylinder. The packer on Fig. 727 is ent to support sizes inches and less. All arger than three inches be placed on suitable ation, or supported by nd screen as described

. 726 illustrates how 27 may be seated at any in the well pipe. A n pipe may also be ed to the bottom of Fig. nd extend down any ce with a screen at the m to permit the pump- water, etc. out of rock where the water, etc., is ed in sand crevices e like, and in which the ipe does not extend to ater bearing stratum. ded, however, water o within pumping dis- of the cylinder.

. 729 is the Seating It is set into the lock bottom of the cylinder, 27, having the iron pipe ds connected to it. It let down into the well. ning forward, the pack- expanded against the tubing firmly, which he cylinder in place.

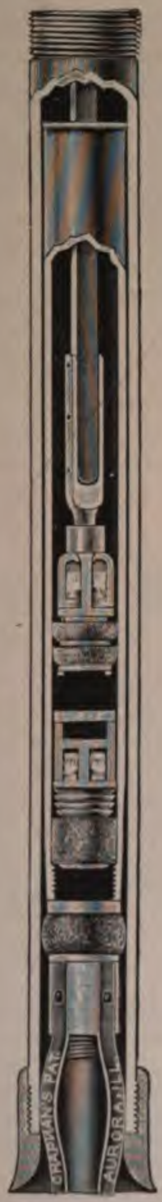


Fig. 726.

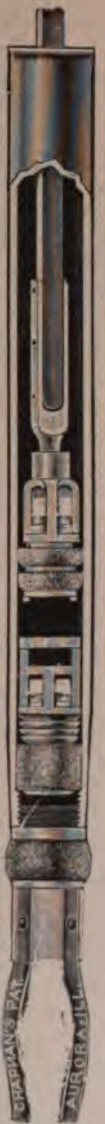


Fig. 727.

Fg.729.

List Prices of Fig. 727, consisting of Brass Cylinder, Valves, Rod Coupling, Packing, Springs and Nipple.

Size pipe in inches Fig. 727 will go into	2	2½	3	3½	4	4½	5	6	7	8
Stroke Cylinder in inches	10	10	12	20	24	24	24	24	24	24
Size of Strainer Pipe in inches, if required	1	1¼	1½	2	2½	3	3½	4	4½	6
Price Fig. 727, no strainer	$10.00	$14.00	$25.00							
Price Fig. 727, to be supported from below				$42.00	$56.00	$80.00	$95.00	$120.00	$160.00	$200.00
Price per foot for additional length of cylinder	2.50	3.00	3.50	4.00	4.50	6.00	7.00	8.00	10.00	12.00
Price Fig. 729, Seating Tool	1.00	1.50	2.00	3.00	3.50	4.00	5.00	6.00	7.00	8.00

In ordering valves specify that they are for Fig. 727 Cylinder. Valves used in Fig. 727 are not like cut but are Chapman's Patent, Figs. 724 and 725.

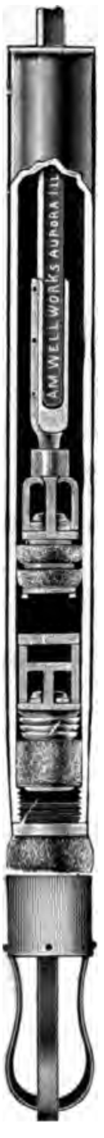

AM. WELL WORKS AURORA ILL.

Fig. 918.

Seat-in and Hang-in ...Cylinders...

Fig. 918 illustrates our EUREKA CYLINDER to be inserted into a tubular well after it is sunk. The bottom coupling springs hold bottom coupling from turning in well pipe. Seating tool on drill rods turns top part of cylinder screwing bottom coupling up and expanding rubber packing against well pipe, forming a tight joint and firm seat. After cylinder is in place, put in valves and rods. Reverse the operation for removing.

Fig. 1383 shows our **Hang-in Cylinder.** It consists of a brass tube, check valve and a 2-leathered brass plunger valve. The cylinder is considerable longer than length of stroke to allow for length of valve and clearance. The bottom and top plugs screw to inside of the brass tubing. This cylinder is first-class and substantial.

Fig. 1686 is same as Fig. 1383, but has 4 Lea. Plunger.

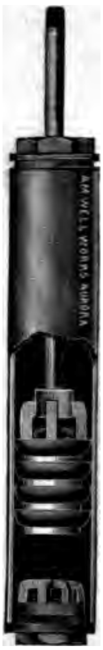


Fig. 1686.

Fig.

Price Fig. 918 Eureka Cylinder.

Size Pipe seats in	Length Stroke.	2	2½	
Fig. 918, complete	8	$4.40	$6.50	$1
" " "	12	5.00	7.50	1
" " "	16	5.50	8.50	1
" " "	20	6.00	9.50	1
Spring Dog Coupling only		.70	1.00	

Price of Seating Tool for Fig. 918..................................$.

Price, Fig. 1383 Cylinder Complete.

Size Pipe will go into	2	2½	3	3½	4	4½	5
Outside Diam. Cyld.	1⅞	2¼	2¾	3¼	3¾	4¼	4¾
Size Pipe screws to	1	1¼	1¼	1½	2	2½	3
8 inch Stroke	$ 9.00	$10.00	$11.00	$14.00	$18.00	$22.00	$27.00
12 " "	9.60	10.80	12.20	15.60	19.80	24.16	29.60
16 " "	10.20	11.60	13.40	17.20	21.60	26.32	32.20
20 " "	10.80	13.40	14.60	18.80	23.40	28.48	34.80
24 " "	11.40	15.80	16.80	20.40	25.20	30.64	37.40
36 " "	13.20	17.60	19.40	25.20	30.60	37.12	45.20

Price List of Fig. 1686, with 4-Leather Plunger.

20 inch Stroke	$ 9.80	$11.90	$12.60	$16.30	$19.90	$24.20	$29.30
24 " "	10.40	14.30	15.50	18.00	22.00	27.00	32.00
36 " "	12.20	16.00	17.50	22.50	27.00	33.00	40.00

Chapman's Tubular Well Valves.

. 43

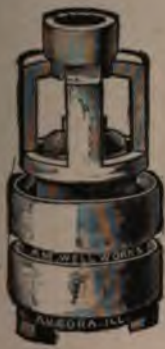


FIG. 724

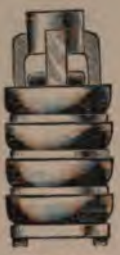


FIG. 797

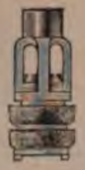


FIG. 798

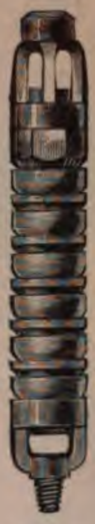


FIG. 392

. 46

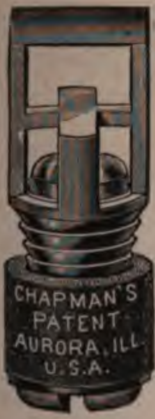


FIG. 725

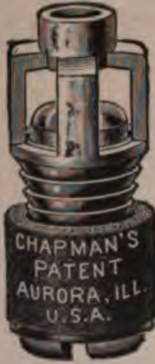


FIG. 702

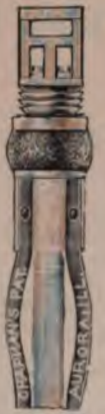


FIG. 728

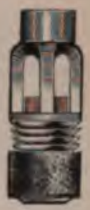


FIG. 279

PRICE CHAPMAN'S TUBULAR WELL VALVES.—PATENTED.

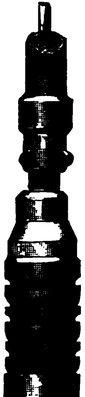
in Inches (Full pipe size.*)	2	2½	3	3½	4	4½	5	6
724-702 or 724-725, per set	$1.50	$3.70	$5.10	$9.50	$13.00	$20.00	$30.00	$50.00
725, Check Valves only	90	2.20	3.00	5.50	8.50	13.00	19.50	32.00
724, 798, Plunger Valves Only, p, each	.80	1.90	2.50	4.50	7.00	11.00	16.50	28.00
ar but 3 Cup, each	1.10	2.30	3.00	5.50	8.50	13.00	20.50	34.00
er but 4 Cup, each	1.40	2.80	3.50	6.50	10.00	15.00	24.50	40.00
79, per Set	9.00	13.50	22.50	34.00	56.00	63.00	77.00	90.00
28, Valves and Springs, per Set	3.10	5.90	8.10	13.30	17.50	25.50	34.60	58.70

s on application for Valves smaller than 2 and larger than 6 inches.

n ordering Valves for Figs. 727 or 918 Cylinders, so state, as they are of smaller diameter.

nted March 4th, 1873 and September 21st, 1886.

Fig. 1691.



Prices of Chapman Deep Well Valve Parts.

Size Valve—inches	2	2½	3	3½	4
Cage for Figs. 43, 703, 724, 728, 797, 798, 919	$.40	$.80	$1.50	$2.50	$3.30
Rings of Figs. 43, 703, 724	.12	.30	.36	.45	.60
Bottoms of Figs. 43, 702, 724	.40	.70	1.10	2.00	3.10
Rubber Balls	.20	.30	.40	1.10	1.20
Brass Balls, see Fig. 1166, another page.					
Cage for Figs. 48, 702, 725, 728, 730, and 1692	.50	.90	1.80	2.70	3.30
Bottom for Figs. 48, 702, 725, 730 and 1692	.40	.80	1.20	2.20	3.10
Brass Rings for Figs. 48, 702, 725, 797, 1692	.10	.20	.30	.40	.50
Rubber Rings for Figs. 48, 702, 725, 730, 1692	.20	.30	.50	.90	1.20
Poppet (Brass) for Figs. 703, 724, 797, 919	.20	.30	.40	.70	1.00
Poppet (Brass with Rubber), for Figs. 702, 725, and 1692	.30	.40	.50	.90	1.30

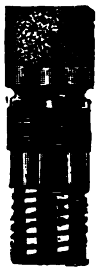


Fig. 1524, Foundation supporting a Check Valve or Cylinder any depth in well pipe.

F

Fig. 919
2-in. Per

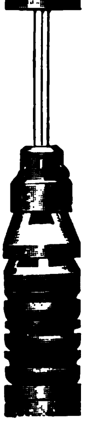


Fig. 1690.

Prices Fig. 223 and 228 Valves and Parts.

Diam. Water Cyl.—inches	1⅛	1⅜	1¾	2¼	2¾	3¼	3¾	4¼	4¾	5¾
Per Set, **Figs 223** and **228**	$6.50	$8.50	$11.00	$17.50	$22.00	$38.00	$56.00	$68.00	$90.00	100.00
Cage for " "	1.50	2.00	2.50	3.50	4.50	7.00	11.00	14.00	18.00	20.00
Center Tube for **Fig. 223**	2.00	3.00	3.00	4.00	6.00	11.00	14.00	16.00	19.00	24.00
Brass Rings, (set of 3), **Fig. 223**	.40	1.20	1.20	2.10	2.40	3.00	4.80	7.00	10.00	12.00
Nut Cage for **Fig. 223**	.70	1.20	1.20	2.00	2.50	3.00	5.00	6.00	10.00	12.00
Cage for **Fig. 228**	1.50	2.00	2.50	3.50	4.50	7.00	11.00	14.00	18.00	20.00
Center Tube for **Fig. 228**	2.00	3.00	3.00	5.00	6.00	11.00	14.00	16.00	20.00	24.00

Figs. 223, 228, 1689, 1690, 1691 copyrighted in 1896, by The American Well Works.

Other cuts previously copyrighted.

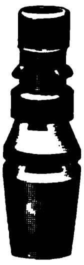


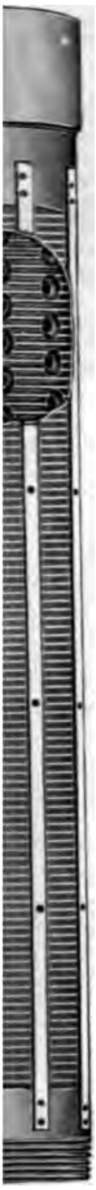
Fig. 1689.

Prices Figs. 1689, 1690 and 1691 Two Stroke Valve Parts.

Diam. Cyl.—inches	2¾	3¼	3¾	4¼	4¾	5¾	6¾	7½	8½	9½
	$	$	$	$	$	$	$	$	$	$
Main Frame of Figs. 1689, 1690, 1691	13.00	15.00	17.60	21.00	27.00	35.00	45.00	59.00	80.00	122.00
Upper Cover of " " " "	.80	1.00	1.20	1.30	1.70	2.20	2.80	3.70	5.00	8.00
Lower " " " " " "	2.40	3.00	3.50	4.10	4.80	6.60	8.40	11.00	15.00	23.00
Rod Coupling " " " " "	1.60	2.00	2.40	2.60	3.40	4.40	5.60	6.40	10.00	15.00
Lock Nuts " " " " "	.50	.70	.80	1.00	1.20	1.60	2.00	2.50	3.50	5.30
Brass Rings, each **Figs. 1690, 1691**	.30	.40	.50	.60	.70	.90	1.10	1.50	2.00	3.00
Fig. 1524 Foundation	16.00	20.00	23.50	26.50	33.50	44.00	56.00	73.00	100.00	153.00

***Figs.* 1689, 1690, 1691 complete,** are listed with Fig. 1581.

Artesian Well Screens.



1284.

Fig. 42. Iron Plug, for stopping bottom end of Fig. 1284 after it has been placed in water bearing stratum in well.

Fig. 44. Seal, is for making a tight joint between top end of Fig. 1284 and well casting pipe after screen has been placed in well with top coupling shown (or another length of pipe screwed into it) extending up into well casing pipe. The botton of Fig. 44 screws into coupling of Fig. 1284 and expands rubber packer. The seal is removable at any time by simply unscrewing it and lifting it out.

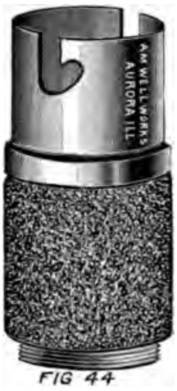


FIG 44

Fig. 1284. Screen is the latest improved, and represents the best large sized well screen manufactured. It has greater inlet capacity, is stronger, and less liable to damage in putting in place than any other. It is better policy to put in a strong removable screen and seal than to put in light brass screen and packer which have to be split and destroyed to remove them. This screen is made of wrought iron tube, the holes are drilled and countersunk, the surface is then grooved, providing water ducts around the body of screen to take advantage of full surface. It is then galvanized and covered with slotted quicksand copper wire covering, and galvanized steel protecting strips, making a nondestructible screen of the strongest type, and of larger inlet capacity than other makes. A length of screen equal to six diameters has an inlet area in excess of the capacity of the pipe of which it is made. In determining length to be used in a well, be governed by amount of water desired from well, and especially by the nature of the material from which water is obtained. Lengths used vary from ten to seventy feet in large deep wells. About one foot of the length of each screen is taken up by coupling and riveted ends.

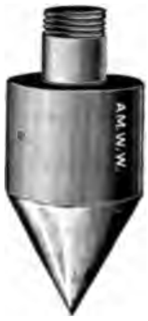


FIG 42

PRICE SCREENS, PACKERS, PLUGS.

and screw to, inches......	3	3½	4	4½	5	6	7	8	9	10	12
l used in "	4½	5	5⅝	6	7	8	9	10	12	13	15
eel strips..........	3	3	3	4	4	6	7	8	9	10	12
en, only..................	Sabe	Sebe	Sibe	Sobe	Sube	Saca	Seck	Sige	Sogg	Soog	Sugh
foot..................	$3.30	$3.90	$4.30	$4.70	$6.30	$8.00	$9.75	$11.50	$13.50	$16.00	$20.00
g. only........	Sico	Socu	Sadd	Seed	Sidd	Sodd	Sudd	Saht	Seht	Sohr	Saak
en Plug*................	1.30	1.60	2.00	2.50	3.00	3.50	4.00	5.00	6.00	6.80	8.50
ker, only...............	Saff	Seff	Siff	Soff	Suff	Sage	Segg	Seke	Sook	Suku	Salo
er, each..................	7.00	8.00	9.00	11.00	12.50	15.00	17.50	19.00	21.00	25.00	30.00

Fig. 42 *Plug is ordered with Fig.* 1284, the screen is fitted to receive it without charge.

Tubular and Artesian Well Screens.

Fig. 265 shows our Copper Slotted Wire Covered Screen, made of galvanized standard pipe, forated and covered. It is made with closed point, and also with open point, as preferred. sent with closed end 1½ inch and smaller sizes unless otherwise ordered. The inlet area is varying two diameters in length to equal capacity of pipe of which it is made in small sizes, times in largest size. If coupling or reducer wanted, charged extra.

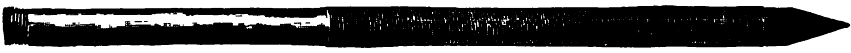


Fig. 265.

PRICES FIG. 265 OPEN OR CLOSED SLOTTED WIRE SCREENS.

Diameter pipe made of and screws to	Length Screen, feet.	Length Jacket, feet.	Smallest Diam. well for, inches.	Price. each.
1 inch	2½	1½	2	$3.00
"	3	2	"	3.60
"	4	3	"	4.80
Add for each additional foot in length				1.20
1¼ inch	2½	1½	2½	3.90
"	3	2	"	4.60
"	4	3	"	6.00
Add for each additional foot in length				1.50
1½ inch	3	2	2½	5.25
"	4	3	"	7.00
"	5	4	"	8.75
Add for each additional foot in length				1.75

Diameter pipe made of and screws to.	Length screen, feet.	Length Jacket, feet.	Smallest Diam. well for.	Pri
2 inch	3½	2½	3	$ 7
"	4	3	"	8
"	5	4	"	10
Add for each additional foot in length				

Fig. 265 Screens, Closed or Open Ends. one foot of each screen not covered. take ing prices per foot any length.

2½ **inch** goes in	3½	well, per foot	$2
3 "	" 4½	" "	3
3½ "	" 5	" "	3
4 "	" 5⅝	" "	4
4½ "	" 6	" "	4

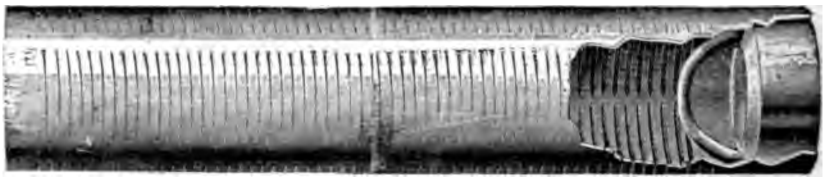


Fig. 883.

Fig. 883 shows our Cook Seamless Brass Tube Slotted Screen, to be used in tubular wells. top end extends into well casing pipe, and is sealed with this pipe by expanding a lead packer on top of screen against well casing. The bottom end is made closed, or may be made open and stopped plug as shown. Made in lengths listed, and of longer lengths in *even number* feet.

PRICES, FIG. 883 SCREEN WITH LEAD PACKER.

Diameter well for........inches	2	2½	3	3½	4	4½	5	6	7	
Length ....feet	4	4	6	6	8	8	10	10	12	
Price, length listed	$3.75	$6.50	$11.00	$15 25	$23.00	$25.50	$35.50	$46.00	$72.	$
Price, for each additional **2 feet**	2.25	2.50	3.00	4.25	5.00	5.50	6 50	8 00	11.	

Tubular and Drive Well Screens.

BRASS JACKET SCREENS FOR TUBULAR WELLS.

Flush point screens made of galvanized wrought pipe.

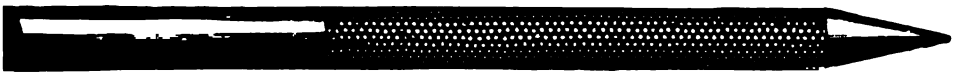


FIG. 894.

This point is so constructed that it can be driven from the inside. The plug is securely riveted the pipe. If longer blanks are needed than listed, they can be furnished at cost of additional length ch screen is covered with wire gauze, and outside of that with perforated sheet brass.

PRICES EACH FOR FIG. 894 SCREENS.

ameter Screen. Inches.	Length in Feet.	Length of Jacket. Inches	Holes.	60 Gauze.	80 Gauze.	100 Gauze.
1	3	18	72	$3.25	$4.25	$ 5.50
"	3½	24	96	4.00	5.00	7.00
"	4	30	120	4 75	6 00	8.50
"	5	42	168	6.25	7.75	11.00
1¼	2½	18	100	3.50	4.75	7.25
"	3	24	130	4 25	5.75	8 50
"	3½	30	165	5.25	6.75	10.00
"	4	36	200	6.00	7.75	12.00
"	5	48	260	7.75	9.75	15.00

Prices quoted on larger sizes on application.

BRASS JACKET SCREENS FOR DRIVE WELLS.

Made of galvanized wrought pipe.

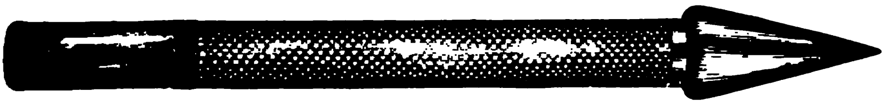


FIG. 893.

Each Screen is covered with wire gauze and outstde of that with perforated sheet brass.

PRICES EACH FOR FIG. 893 SCREENS.

ameter Screen. Inches.	Length in Feet.	Length of Jacket. Inches.	Holes.	60 Gauze.	80 Gauze.	100 Gauze.
1	2	18	72	$2.75	$2.90	$ 5.25
"	2½	24	96	3.50	4.75	6.75
"	3	30	120	4.25	5.60	8.00
"	3½	36	144	5.00	6.50	10.00
1¼	2	18	100	3.00	4 50	7.00
"	2½	24	130	4 00	5.50	8 50
"	3	30	165	4.75	6.50	10 00
"	3½	36	200	5.50	7.50	12.00
1½	2	18	120	4 00	5.50	8.00
"	2½	24	162	5.00	6.75	10.00
"	3	30	198	6.00	8.00	12.00
"	3½	36	240	7.00	9.25	14.00

Packers, Seals, Foot Valves.

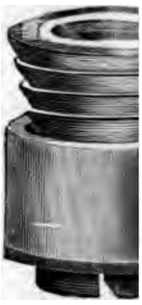


Fig. 805

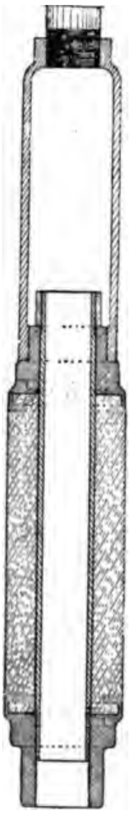


Fig. 1262.

Fig. 805, Seal, is used for sealing or packing joints in a well between a large sized casing pipe and a smaller one below it, and which latter extends up into larger one a short distance. It is also used in like manner for sealing or packing joint between top end of a screen and casing pipe of a well. In either case, it makes a tight joint between the two pipes to shut out sand and other material.

The bottom end of Fig. 805 is made to pass inside of a coupling or reducer screwed to the top end of lower pipe, the coupling striking and shoving rubber packing up on serrations when body of seal is pushed down, thus expanding rubber against wall of larger pipe.

The inside of top end of Fig. 805 has pipe thread by which it is put in place or removed.

Fig. 1262, Dresser Packer, is used for packing a pump tube in a larger well pipe or rock hole to shut out water from above, to permit pumping lower stratum. It is also used in gas wells for shutting out water strata above the gas bearing stratum.

It packs by shoving the top part of the packer down, expanding the against the walls of the hole, and it is removed by reversing the operation.

Fig. 176, Foot Valve with strainer, is used on suction pipes for pum strainer to keep out coarse obstructions, and the check valve inside to m suction pipe full of water when pump is not running. It should be used in al where suction pipes are of considerable length.

DRESSER PACKERS, FIG. 1262.

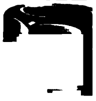
Hole packs in*, Inches.	Pipe screws to, inches.	Length Rubber, inches.	Code, packer complete, only.	Price, Complete.	Pri Rubbe
3½	2½	10	Pabo	$ 11.00	$ 6
4	2	10	Paco	12.00	6
4	2	16	Pado	18.00	12
4¼	2	10	Pafo	12.00	6
4¼	2	16	Pago	18.00	12
4½	3	10	Paho	12.00	6
4½	3	16	Pako	18.00	12
5	3½	10	Palo	18 00	10
5	3½	16	Pamo	24.00	16
5⅝	4	16	Pano	25.00	17
6	4½	16	Papo	28.00	18
7	5	16	Paro	40.00	19
8	6	16	Paso	50.00	20
9	7	16	Pato	65.00	25
10	8	16	Pavo	80.00	30
11⅝	9⅝	16	Payo	90.00	35
13	10	16	Pazo	100.00	40

*Made also for oil well casing sizes not listed, at price of next larger standard pipe size liste

†These packers made to expand by screwing together at **25 per cent.** net extra.

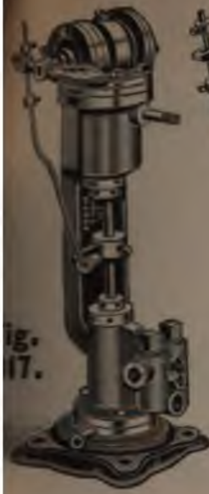
PIPE AND SCREEN SEAL, FIG. 805.

Pipe or hole seals in ....inches.	2	2½	3	3½	4	4½	5	6	7	8	9	10
Top pipe thread, and pipe coupling bottom enters to expand rubber, ... "	1¼	1¼	2	2½	2½	3	3½	4½	5	6	7	8
Price, Fig 805 Seal, ...	$1.50.	$2	$3.	$5.	$8.	11.	$15.	$19.	$24.	$30.	$36.	$42.



PRICE OF FIG. 176, FOOT VALVE WITH STRAINER.

Pipe screws to, inches,	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price, ...**each,**	$1.20	$1.40	$2.00	$3.00	$4.00	$5.00	$6.00	$7.50	$9.00	$11.	$14.



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17.

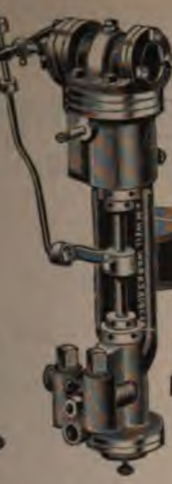


Fig.
1318.

Boiler Feed Pump, with Balanced Steam Valves.

Figs. 1317, (vertical pattern,) and **1318,** (horizontal or vertical side base pattern) show our 15-Horse Power Boiler Feed Pumps. They pump hot or cold water, and either will supply boiler not exceeding 15 horse power. Can be adjusted to hold the water at a uniform level.

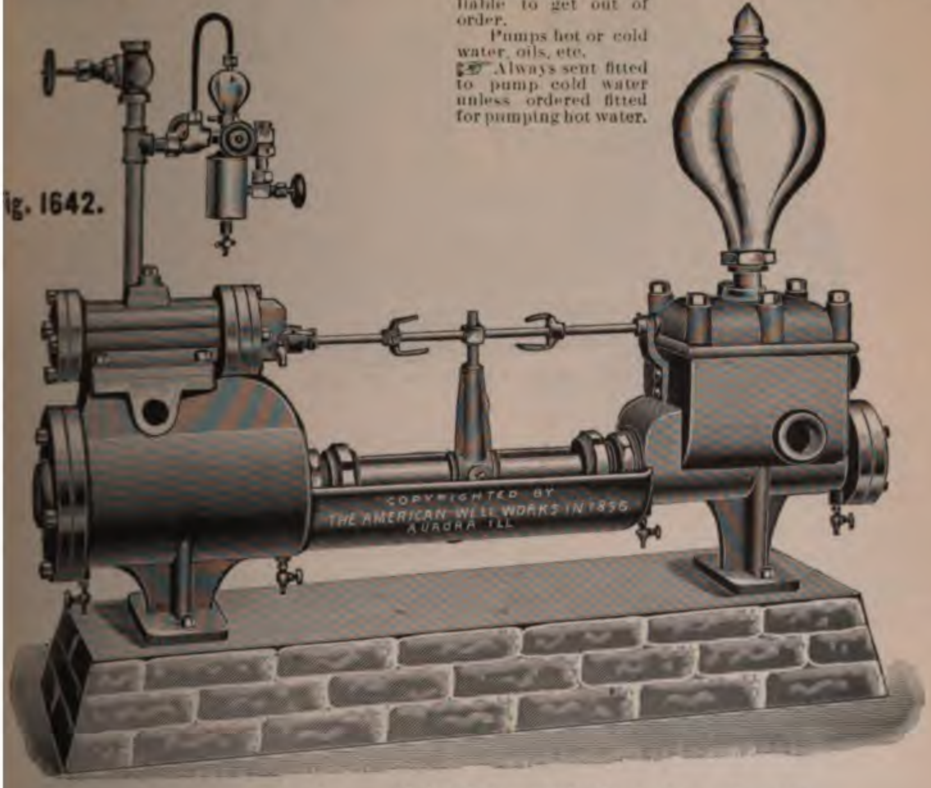
Steam Cyl. 2½ in.; Water Cyl. 1¼; Stroke 2½; Capacity per minute 2 Gals.; Steam Pipe ¼; Exhaust Pipe ⅜; Suction Pipe ½; Delivery Pipe ½. **Price $23.00.**

FIG. 1642 Chapmans' Patent Balance Valve, Positive Acting Boiler Feed and Fire Pump.

For pumping water for extinguishing fires, filling boilers, etc. Its balance steam valve requires but the slightest touch to instantaneously reverse, and by it the accuracy of the length of the stroke is determined. It will work very slowly or run with lightning rapidity and not stop, pumping the exact amount of water needed. Is economical, and not liable to get out of order.

Pumps hot or cold water, oils, etc.

☞ Always sent fitted to pump cold water unless ordered fitted for pumping hot water.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THE AMERICAN WELL WORKS IN 1896
AURORA ILL.

ig. 1642.

Sizes and Prices for Our Chapman Patent Balance Valve Steam Pump, Fig. 1642.

H. P. Boiler it will supply.	Steam Cyld.	Water Cyld.	Stroke.	Speed per minute, Ft.	Capacity per min., Gals.	Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Delivery Pipe.	Floor space required, In.	Price Pump for cold water.	Price Pump for hot and cold water	Price for Hand Attachment.
20	3	1½	3	60	5½	½	¾	1	¾	24 x 6	$29.00	$35.00	$3.50
45	4	2	4	78	12	½	¾	1¼	1	28 x 7	50.00	55.00	5.50
[illegible]	4½	2½	4	76	20	½	¾	1½	1¼	28 x 7	55.00	60.00	6.00
[illegible]	6	3	8	100	37	¾	1	2	1½	44 x 9	91.00	100.00	10.00
The water end of Nos. 5, 6, 7 and 8, is bolted to the steam end in the same manner as Fig. 1568.													
150	6	3½	8	100	50	¾	1	2	2	44 x 10	105.00	116.00	12.00
175	6	3¾	8	100	57	¾	1	2½	2	44 x 11	110.00	121.00	12.00
200	6	4	8	100	65	¾	1	2½	2	44 x 12	115.00	127.00	12.00
	6	5	8	100	102	¾	1	3	2½	44 x 14	130.00	143.00	14.00

Chapmans' Pat. Long Stroke, Economical Duplex Steam Pumping Engine.

FOR ALL DUTIES.

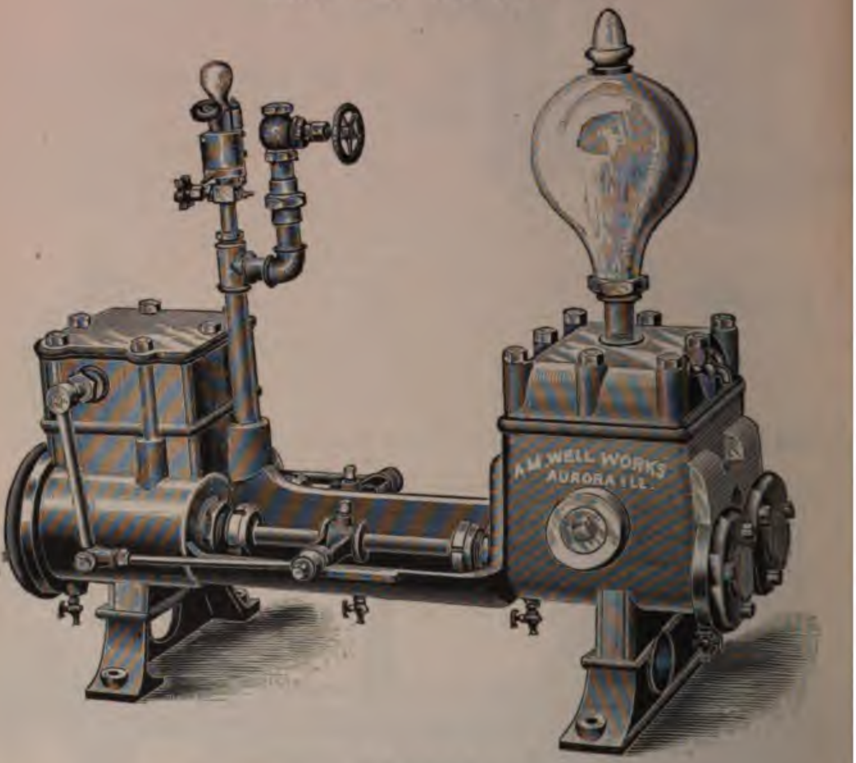

Fig. 1282.

We pack the Water Plunger with leather cups. The steam slide valves are flat, as in ste engines; the water valves are hard rubber, the valve seats are bronze. For hot water, m plungers are used.

The following prices are for iron pumps. We furnish to order, pumps in other me State the duty and size wanted.

SIZE AND PRICE OF DUPLEX STEAM PUMPS.

Number.	Dia. of Steam Cylinder.	Dia. of Water Plungers.	Length of Stroke.	Gallons Delivered per minute by both Plungers.	H. P. Boilers they will supply	Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Discharge Pipe.	PRICES.
1	3	2	4	6 to 12	20	⅜	¾	1¼	1	$ [illegible]
2	4	2⅜	6	12 to 25	40	½	¾	1½	1¼	[illegible]
3	5	3	6	25 to 55	100	¾	1	2	1½	[illegible]
4	6	4	8	50 to 100	200	1	1¼	2½	2	[illegible]
5	6	5	8	75 to 125	300	1	1½	4	3	[illegible]
6	6	6	8	110 to 180	400	1	1½	4	3	[illegible]

Pumps fitted with bronze plunger rods, 10 per cent. additional. Fitted with bronze p rods, water piston heads and water cylinder linings, 20 per cent. additional.

Chapmans' Duplex Steam Pumping Engines.

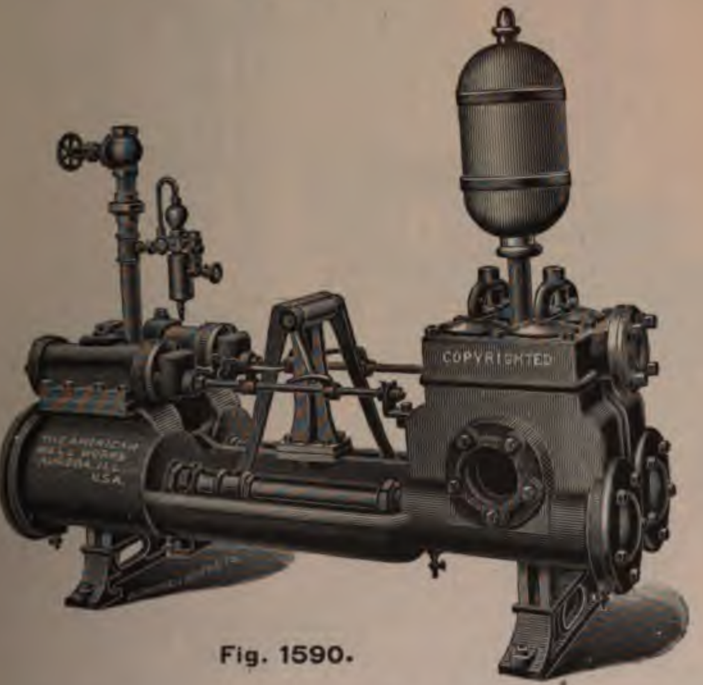
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Fig. 1590.

Fig. 1590 is an illustration of one of our Balance Valve Duplex Pumping Engines. It is used for pumping hot or cold water into boilers, for fire purposes, etc. It has the latest improvements, and made of the best materials, Bronze Piston Rods, Brass Lined Water Cylinders. For hot water, bronze valves are used. It has all the good qualities and valuable features of other pumps. In addition, it has our Patent Balance Steam Valve, which makes it by far the best pump on the market.

LIST PRICES OF FIG. 1590.

Number of Pump.	Dia. of Steam Cylinder in inches.	Dia. of Water Cylinder in inches.	Length of Stroke in Inches.	Approximate Capacity Gals. per minute.	Size Steam Pipe in Inches.	Size Exhaust Pipe in Inches.	Size Suction Pipe in Inches.	Size Discharge Pipe in inches.	LIST PRICES.
1	7	4	8	50 to 100	1½	2	3½	3	$ 296.00
2	7	4½	8	60 to 110	1½	2	4	3	315.00
3	7	5	8	75 to 125	1½	2	4	3	340.00
4	8	4	10	50 to 100	1½	2	3	2½	400.00
5	8	4½	10	60 to 110	1½	2	4	3	425.00
6	8	5	10	80 to 160	1½	2	4	3	450.00

Chapmans' Long Stroke

Duplex Steam Fire Pum ing Engine.

ALSO

Compounded for Water Works Service.

Fig. 1283.

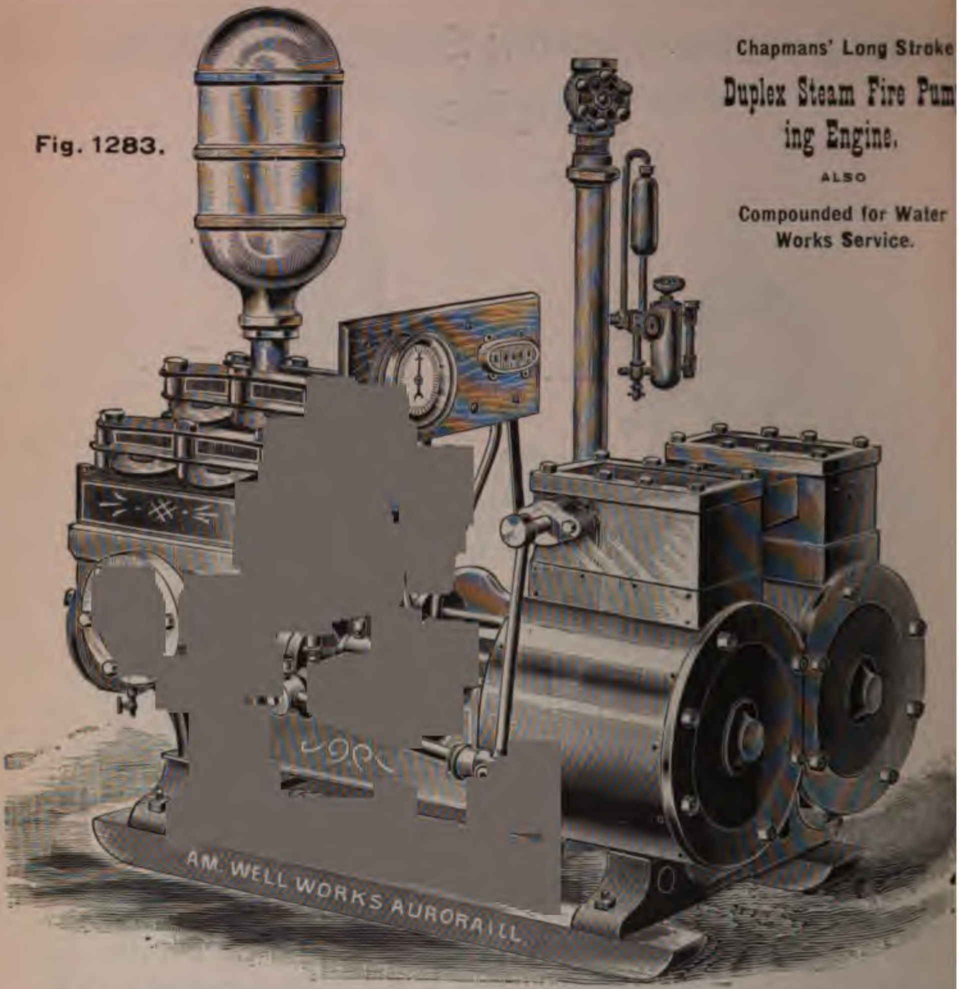
AM. WELL WORKS AURORA ILL.

Fig. 1283 is an illustration from a photograph of a most effectual **Fire Pump.** The steam slide valv motion is perfect, and of the fewest parts. The water valves can be readily examined: its simplicity commens it, and its symmetrical proportion of parts makes it perfect. It is used for filling boilers and in case of fir It throws a deluge of water with sufficient force to break windows and tear off shingles. It will throw a strea of water 150 feet high, or 200 feet horizontally. By placing our nozzles at convenient places, fire can be ext guished without danger of rotten hose, and everything will be in working order when wanted. A water press guage and a counter show the amount of water pumped. The steam ends are lagged to save loss of heat.

Prices and Dimensions Fig. 1283 Pump.

Number.	Diam. Steam Cyl.	Diam. Water Cyl.	Length Stroke.	Gallons per Min. 100 feet piston, 10 per cent. loss.	Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Discharge Pipe.	Prices.
1	10	7	10	350	2	2	6	5	$ 500 00
2	12	7	10	350	2	2½	6	5	550 00
3	14	7	10	350	2½	2½	6	5	610 00
4	12	7	18	350	2½	3	6	5	800 00
5	12	8	18	470	2½	3	7	6	850 00
6	14	7	18	350	2½	3	6	5	900 00
7	14	8	18	470	2½	3	7	6	950 00
8	14	12	18	1057	2½	3	10	8	1000 00

ull Stroke Duplex Water Works Pump.

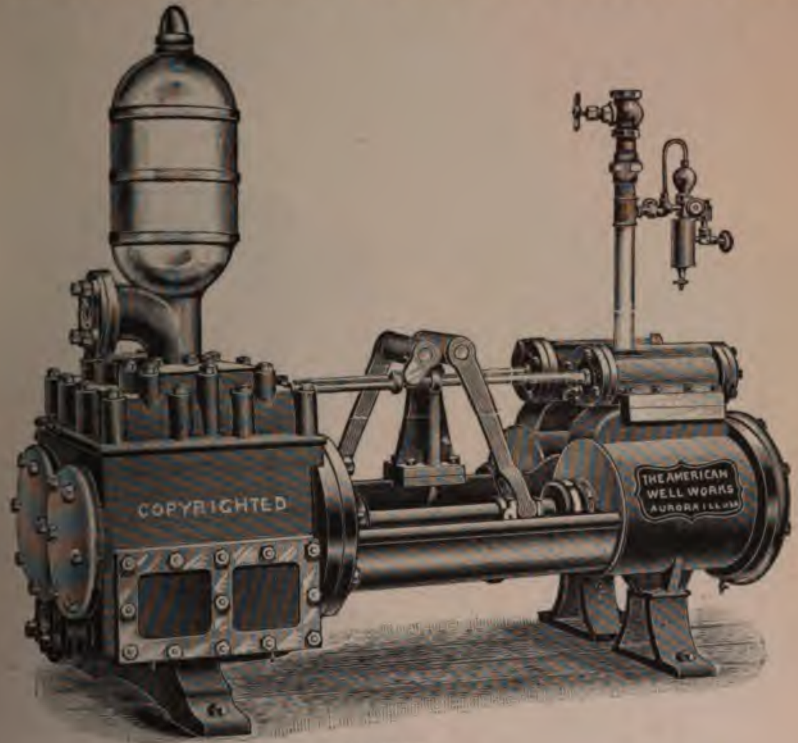
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Fig. 1568.

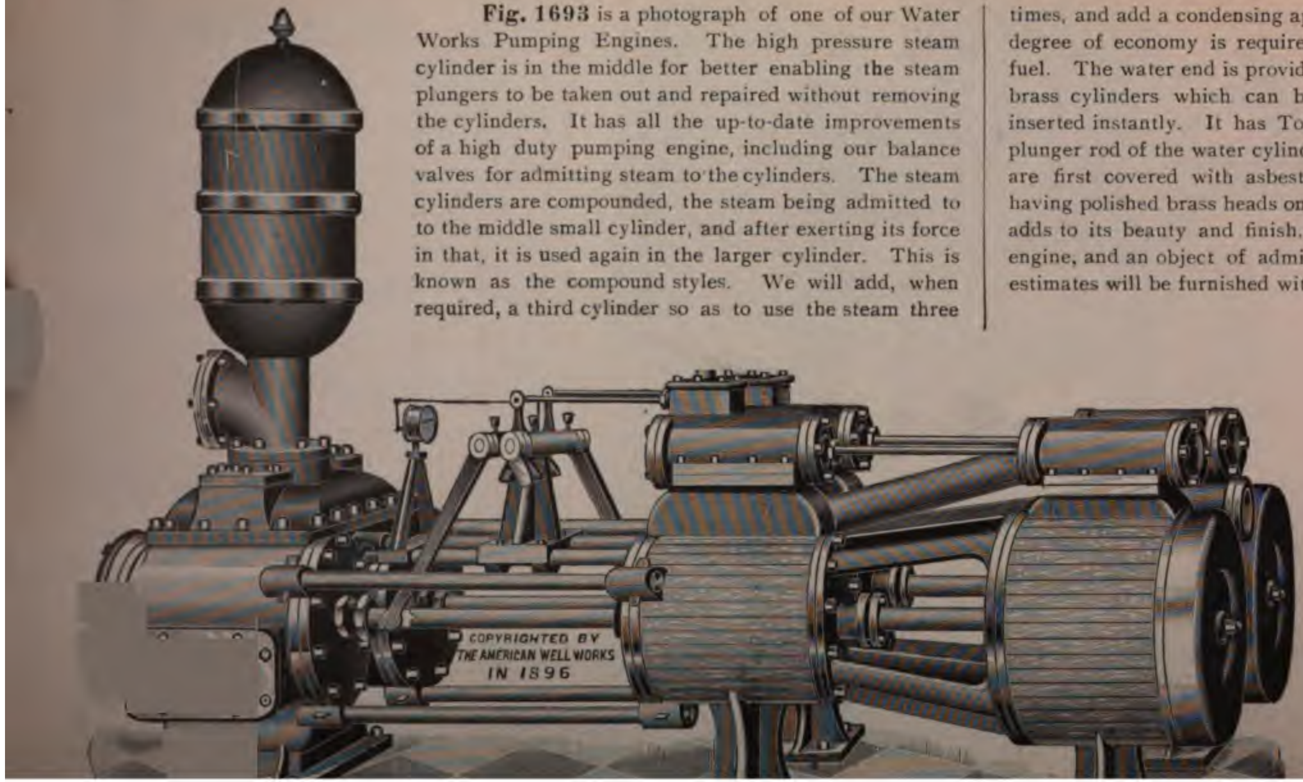
Fig. 1568 respresents our Full Stroke Duplex Steam Pump. It has our patent balance steam valves, and makes full stroke under pressure. Water cylinder shells are removable and when pump is old, new cylinder shells may be put in in a few minutes by removing covers. Suction is in center and gives equal service to both cylinders. It is especially adapted for water-works service. Water end is cast separate.

Diam. Steam Cyld.	Diam. Water Cyld.	Lgth. Stroke.	Gals. per Min. 100 piston ft. less 10% loss.	Short pipes. For longer lengths increase diameter.				Code.	Price.*
				Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Disch. Pipe.		
10	4½	10	148 Make reasonable allowances for heavy lifts.	2	2½	4	3	Paf	$380.
10	5	10	185	2	2½	4	3	Pag	390.
10	6	10	264	2	2½	6	5	Pah	410.
10	7	10	359	2	2½	6	5	Paj	470.
10	9¼	10	628	2	2½	8	7	Pak	565.
12	6	10	264	2½	3	6	5	Pal	535.
12	7	10	359	2½	3	6	5	Pam	565.
12	8½	10	529	2½	3	8	7	Pap	600.
12	9¼	10	628	2½	3	8	7	Paq	630.
12	11½	10	970	2½	3	10	8	Pas	680.
14	8½	10	529	2½	3	8	7	Pao	630.
14	10½	10	839	2½	3	8	7	Pav	690.

*Pumps with water end fitted with bronze plunger heads, Brass Covered Rods and Brass Lined Cylinders 15% ***additional.***

WATER WORKS STEAM COMPOUND PUMPING AND CONDENSING ENGINE, FOR PUMPING WATER FOR CITIES' WATER SUPPLIES. CAPACITY, ONE TO SIX MILLION GALLONS.

Fig. 1693 is a photograph of one of our Water Works Pumping Engines. The high pressure steam cylinder is in the middle for better enabling the steam plungers to be taken out and repaired without removing the cylinders. It has all the up-to-date improvements of a high duty pumping engine, including our balance valves for admitting steam to the cylinders. The steam cylinders are compounded, the steam being admitted to to the middle small cylinder, and after exerting its force in that, it is used again in the larger cylinder. This is known as the compound styles. We will add, when required, a third cylinder so as to use the steam three times, and add a condensing apparatus when the highest degree of economy is required in the consumption of fuel. The water end is provided with removable hard brass cylinders which can be taken out and others inserted instantly. It has Tobin Bronze Rods for the plunger rod of the water cylinder. The steam cylinders are first covered with asbestos, and then with wood, having polished brass heads on the back cylinder which adds to its beauty and finish. It is a highly finished engine, and an object of admiration. Blue Prints and estimates will be furnished with specifications.



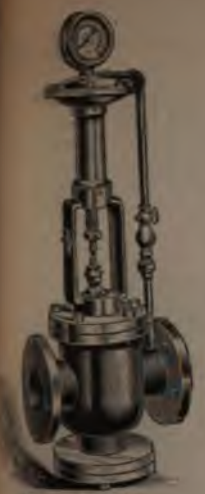


Fig. 1614.

FIG. 1614

IS A STEAM REDUCING VALVE.

Used on a line of steam pipe for reducing the pressure, say from 100 lbs. to 5 lbs., more or less as required.

PRICE LIST FIG. 1614.

1 inch........$25.00	2 inch........$45.00	4 inch........$100.00
1¼ inch........ 30.00	2½ inch........ 60.00	5 inch........ 150.00
1½ inch........ 35.00	3 inch........ 75.00	6 inch........ 175.00

1 inch to 2 inch, screwed.
Above 2 inches, Flanges, Bolts and Gaskets furnished complete.

Fig. 1612 is our Steam Pumping Engine Water Pressure Governor for maintaining a uniform pressure or head of water in tanks, water mains, etc. It is connected to the water discharge of the pump; is adjusted to a determined pressure by hand and regulated by the water pressure automatically. Works automatically. Requires no attention. Saves machinery, labor, coal. Guaranteed to change speed of engine on a variation of 2 lbs. pressure in the main.

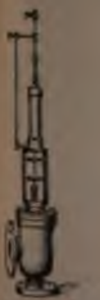


Fig. 1612.

PRICES AND DESCRIPTION OF FIG. 1612.

Size of Wrought Iron Pipe for, In...	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6
Price with Screw Thread Connections.	$25.00	$27.50	$30.00	$35.00	$42.50	$50.00	$58.00	$70.00				
Price with Flanges, Bolts and Gaskets						50.00	60.00	75.00	$87.50	$100.00	$125.00	$150.00

The Seats and Valve to all our Governors and Reducing Valves are made from the best phosphor bronze.

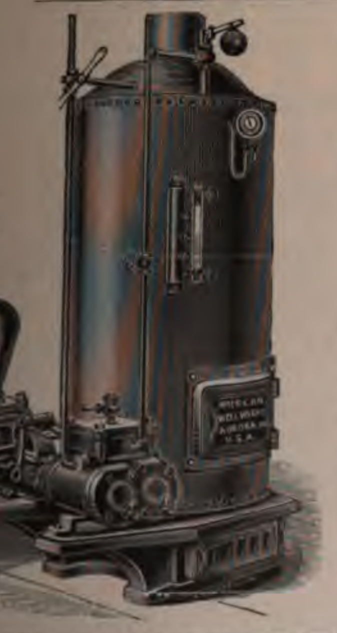


FIG. 576.

Water Station Pumping Plant.

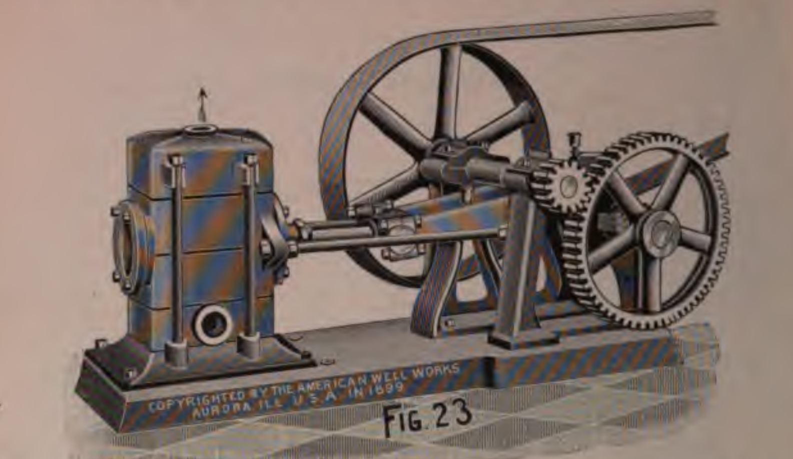
Fig. 576 illustrates a combination of our Vertical Submerged Flue Boiler, **Fig. 1331**, and our Superior Duplex Pumps, **Figs. 1282** and **1590**, fitted on one base. This makes a complete pumping plant for railway water stations and like requirements, all connected complete.

See Figs. referred to for complete description of boiler and pumps.

PRICES, WATER STATION PUMPING PLANT. (Sizes are in. where "Ft." not marked.)

Number.	Fig. Number of Pump used	Diameter Steam Cyl.	Diameter Water Cyl.	Length Stroke.	Steam Pipe.	Exhaust Pipe.	Suction Pipe.	Discharge Pipe.	Diam. Shell	Height Shell.	Tubes.	Length Tubes.	Ht. Stack, Ft.	Diameter Stack.	Price, complete.
1	1282	4	2⅝	6	½	¾	1½	1¼	24	60	13-3	18	10	11½	$275.00
2	1282	5	3	6	¾	1	2	1½	24	66	13-3	24	12	11½	350.00
3	1282	6	4	8	1	1¼	2½	2	30	72	19-3	30	12	15½	440.00
4	1282	6	5	8	1	1½	4	3	30	72	19-3	30	12	15½	480.00
5	1282	6	6	8	1	1½	4	3	30	72	19-3	30	12	15½	515.00
6	1590	7	4	8	1¼	2	3½	3	36	78	30-3	33	16	17	575.00
7	1590	7	5	8	1¼	2	4	3	36	78	30-3	33	16	17	610.00
8	1590	8	5	10	1½		4	3	36	84	30-3	39	16	18	850.00

Horizontal Power Force Pumps.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AURORA ILL U.S.A. IN 1899

FIG. 23

Figs. 23 and **70** show our horizontal force pumps, suitable for taking power from gasoline e line shaft, motor, or other source, and forcing water from any location to a height equal to 15 They are geared 4 to 1, made with moulded or machine cut gears as preferred. Top disc chambers constitute air chambers for discharge. Fitted with tight and loose pulleys when d but shipped with one pulley unless otherwise ordered.

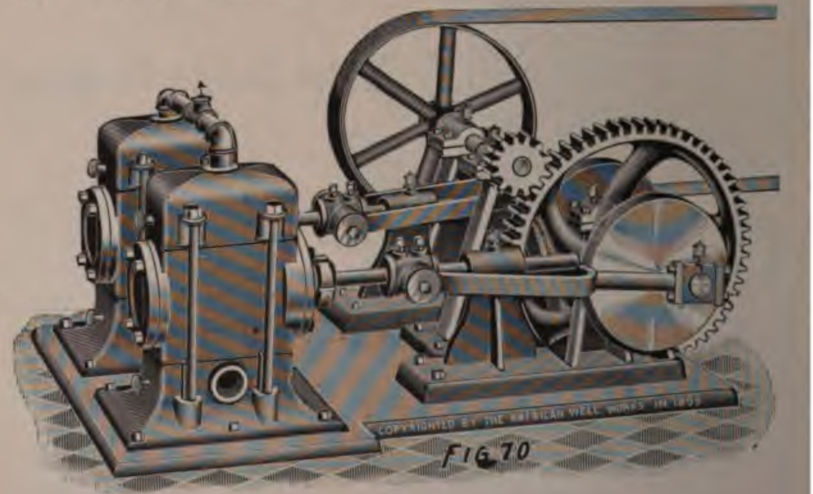
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FIG. 70

PRICES* FIG. 23 AND FIG. 70 HORIZONTAL POWER FORCE PUMP

	Cylinder.		Rev. per Min.	Pulley.*		Total Lifts for ft.	Provide H. P. full Load.	Code.		Price
	Diam.	Stroke.		Diam.	Face.			Moulded Gears.	Cut Gears.	Moulded Gears.
Fig. 23	3	4½	50 to 70	12	3	150	2	Pac	Poc	$ 50.
" "	4	4½	" " "	12	3	"	2½	Pec	Puc	60.
" "	5	4½	" " "	12	3½	"	3	Pic	Puz	80.
" "	6	6	40 to 60	20	4	"	5	Popo	Pupe	150.
Fig. 70	3	4½	50 to 70	16	3½	"	3½	Dupac	Dupoc	92.
" "	4	4½	" " "	16	4	"	4	Dupec	Dupuc	110.
" "	5	4½	" " "	20	4	"	5	Dupic	Dupuz	147.
" "	6	6	40 to 60	20	6	"	8	Dupopo	Dupupe	200.

*If tight and loose pulley wanted increase net price of Fig. 23 by **15%** and of Fig. 70 Cylinder will be brass lined for **10% net extra.** Brass covered piston rods and brass valve seats *put in for* ***10% net*** **extra.**

Triplex Belt Power Pump.

Fig. 1564 illustrates one of our triplex belt power pumps used for pumping water and liquids der all conditions where pump may be placed within suction distance of the supply.

This Pump may be driven by Gasoline or Steam Engine, Horse power or from line shaft.

The cranks are 120° apart giving constant discharge and saving power. The plungers are out- de packed. The valves seat on bronze seats and are easily accessible. Tight and loose pulley for arting or stopping is provided. The gears are moulded or machine cut as ordered, and are **5** to **1**. Fig. 1564 is made suitable for 150 ft. lift, or hydraulic head, above the pump.

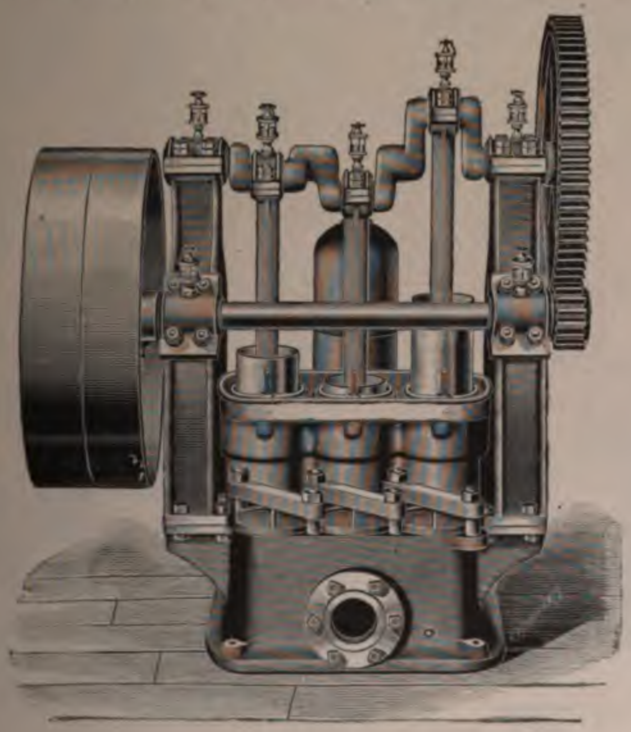


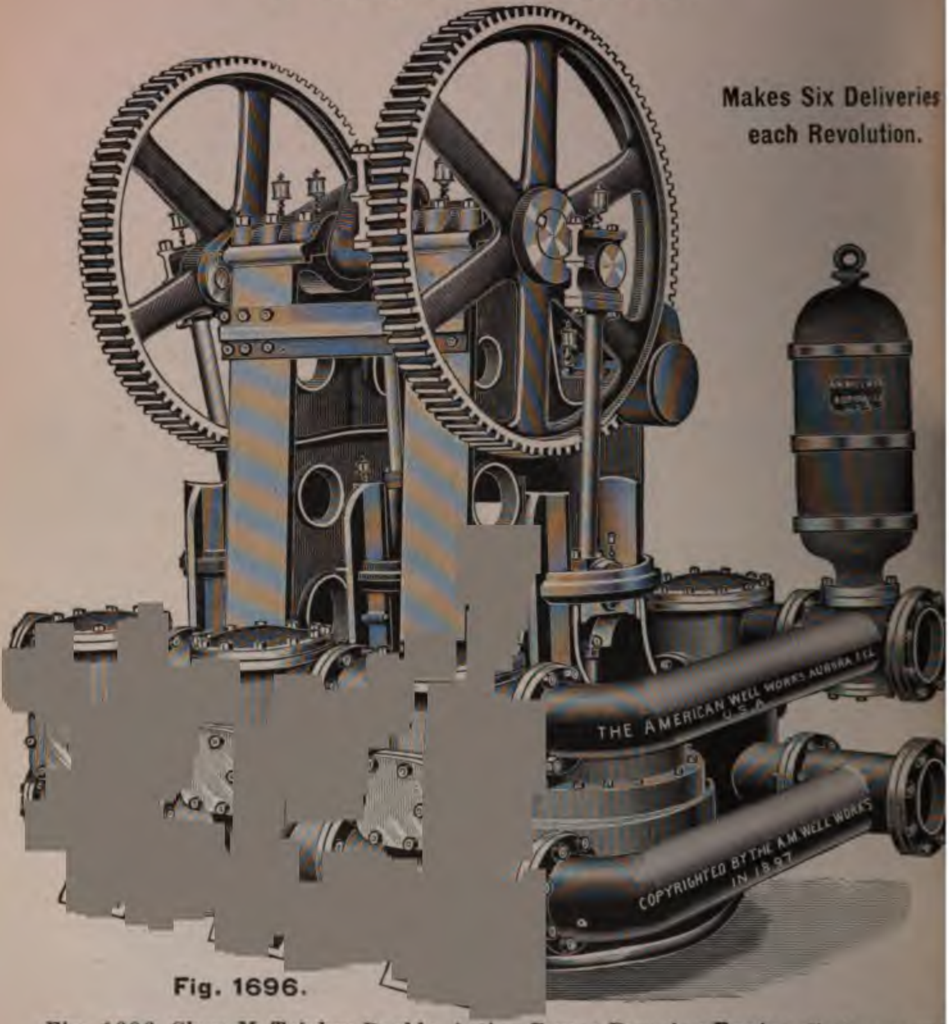
FIG. 1564.

PRICES FOR FIG. 1564 TRIPLEX PUMP IMPROVED.

rs es.	**Stroke Inches.**	Pulleys.		Rev. Per Min.	Gallons Per Rev	Code if Cut Gears	**Price with Cut Gears**	Code if Moulded Gears	**Price with Moulded Gears**
		Diam.	Face						
	4	12	3	40 to 60	.33	Pidumcut	**$180.**	Pidum	**$170.**
	4	15	3½	" "	.60	Pidvelcut	**225.**	Pidvel	**210.**
	6	20	4	" "	.95	Pieloncut	**340.**	Pielon	**320.**
	6	24	4	" "	1.5	Pifsoncut	**380.**	Pifson	**365.**
	8	26	5	" "	2.	Pifrelcut	**435.**	Pifrel	**405.**
	8	30	6	" "	2.8	Pigoncut	**665.**	Pigon	**630.**

ny pump fitted with bronze plungers at net additional price of **15 per cent.**

Triplex Double Acting Power Pumping Engine.


THE AMERICAN WELL WORKS AURORA, ILL. U.S.A.
COPYRIGHTED BY THE A.M. WELL WORKS IN 1897

Makes Six Deliveries each Revolution.

Fig. 1696.

Fig. 1696, Class M, Triplex Double Acting Power Pumping Engine, discharges wa six times each revolution, delivering a continuous stream of water suitable for water-works, fi protection, and such use. It is arranged to be driven on slow motion for ordinary duty, and fa motion for fire purposes, and it can be changed from one to the other instantly without stoppin For heavy duty we use 4 Standards with journal bearings to support the outer cranks. It has ha brass boxes and guides, forged steel crank, steel pins, and forged connecting rods. The valves a of hard rubber or brass as required. It can be driven by Gasoline, Gas, Steam or Electric Engin or belt power from shafting, by pulleys as shown by Fig. 1575.

State when ordering whether wanted to pump hot, cold, muddy or clean water, or other liqui then it will be fitted for the duty required.

Made in nineteen sizes, and of a pumping capacity of from 5 to 1750 gallons per minute, from 7000 to 2½ million gallons per day.

Prices on application.

The Horizontal Right Hand Centrifugal Pump.

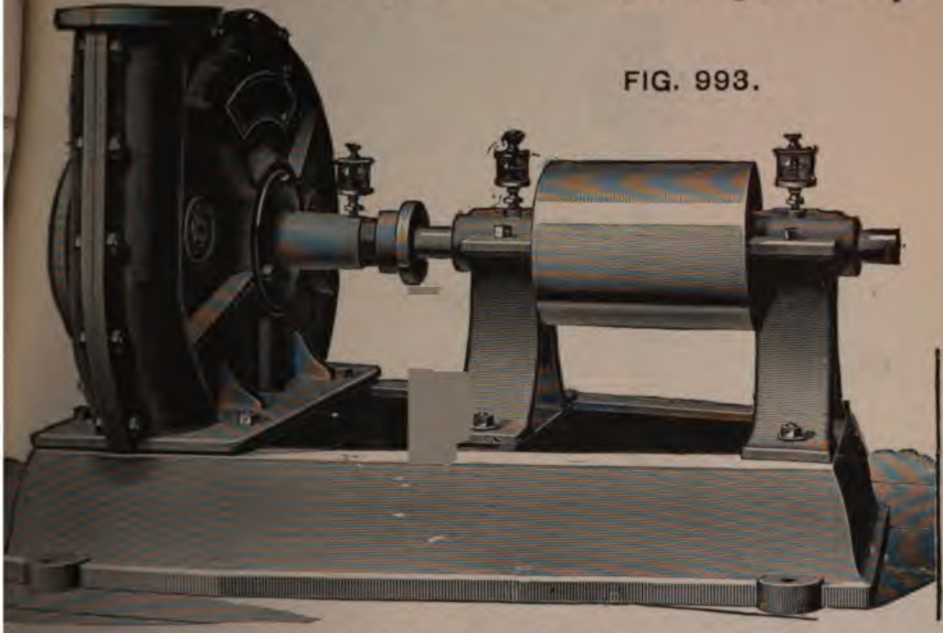


FIG. 993.

Fig. 993 shows our Horizontal Right Hand Centrifugal Pump, preferred by manufacturers nerally. To use same (without priming apparatus) the water must flow to pump and rise as gh as top of shell. For drainage and irrigation work they have a foot valve. In execution, ere is no difference between the Horizontal and Vertical Pump. These pumps when fitted th brass parts are used by makers of refrigerating and ice machinery for circulating brine.

PRICES AND DIMENSIONS.

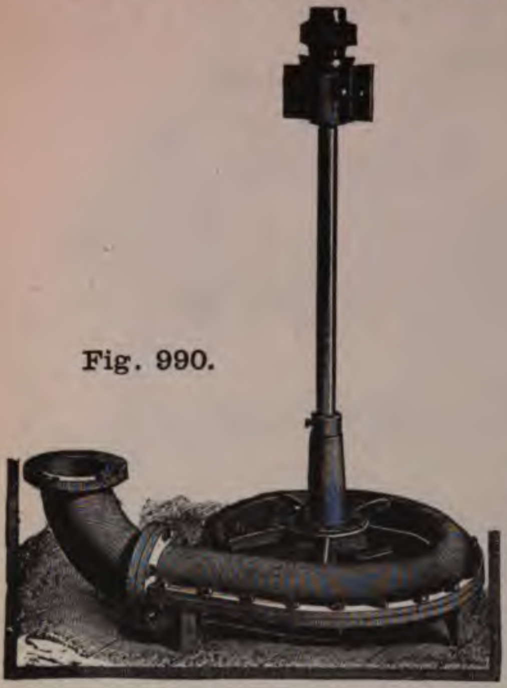
No.	Economical Capacity in Gallons per minute.	Actual Capacity in Gallons per Minute.	Horse Power required for each Foot of Lift. Minimum Quantity.	Diameter and Face of Pulley, in Inches.	Floor Space required in Inches.	Shipping Weight, Pounds.	Price of Pump, Oiler and Wrench, as per Fig. 993.	Price of Pump and Primer, Fig. 992.
1¼	20–40	160	.01	5 x 5	19 x 30	168	$ 35	$ 45
1½	40–60	225	.016	6 x 6	21 x 33	232	50	60
2	60–80	325	.019	7 x 6	23 x 37	306	70	85
2½	80–100	400	.039	7 x 6	24 x 38	348	80	95
3	120–180	675	.047	7 x 7	25 x 39	400	95	115
4	200–300	1300	.078	8 x 10	30 x 40	545	130	155
5	350–500	1900	.14	10 x 10	34 x 54	826	165	195
6	500–700	2700	.22	12 x 12	37 x 55	965	200	240
8	900–1300	4800	.34	18 x 12	45 x 63	1560	310	375
10	1600–2200	7500	.64	20 x 12	51 x 71	2170	395	470
12	2000–3000	10500	.88	24 x 14	62 x 78	3050	500	
15	3000–5000	16500	1.20	30 x 16	77 x 80	6000	710	
18	5000–7000	22000	1.80	36 x 18	93 x 103	9000	1300	
22	7000–10000	35000	2.90	48 x 18	126 x 130	12000		

The number of pump is also diameter of discharge opening, in inches. Where more than feet of discharge pipe is attached to pump we recommend using one or two sizes larger han pump discharge.

For No. 12 and larger sizes we recommend a foot valve or flap valve and ejector for riming.

THE AMERICAN CENTRIFUGAL PUMP.

Fig. 990.



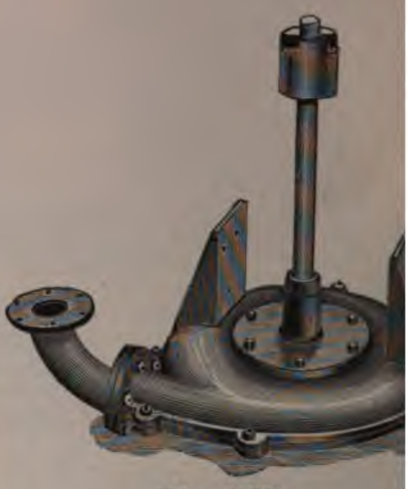


Fig. 597.

Figs. 597 and **990** represent our Vertical Pumps. The shell is of cast-iron, made in ha and bolted together. The fluid enters pump at bottom and is discharged at elbow. This pum intended to stand on bottom of the pit, well or reservoir, or it can be fastened at any required tance from bottom, the only essential point being that Pump should be constantly immersed in fluid to be raised. For draining lock pits, coffer dams, or for use in quarries, mines, etc., in s for any situation in which large quantities of foul water, mud, sand or gravel, are to be ra expeditiously and cheaply, this pump is unequaled.

PRICES AND SPECIFICATIONS.

No.	Economical Capacity in Gallons per Minute.	Actual Capacity in Gallons per Minute.	Horse Power required for each Foot of Lift, Minimum Quantity	Diameter and Face of Pulley, in Inches.	Floor Space required in Inches.	Distance from Bottom of Pump to Center of Coupling.	Coupling is Bored for Connecting Shaft.	Apx. Shipping Weight, Pounds.	Price of Pump with Elbow,
1½	20-40	160	.01	5 x 5	17 x 21	2 ft. 9 in.	1 in.	110	$
1¾	40-60	225	.016	6 x 6	21 x 28	3 "	1 "	140	
2	60-80	325	.019	7 x 6	25 x 29	3 " 4 "	1 1-16 "	181	
2½	80-100	400	.039	7 x 6	27 x 30	3 " 4 "	1 1-16 "	200	
3	120-180	675	.047	7 x 7	27 x 32	3 " 4 "	1 1-8 "	214	
4	200-300	1300	.078	8 x 10	30 x 39	4 "	1 7-16 "	346	
5	350-500	1900	.14	10 x 10	30 x 45	4 " 7 "	1 11-16 "	549	
6	500-700	2700	.22	12 x 12	38 x 48	4 " 7 "	1 13-16 "	665	
8	900-1300	4800	.34	18 x 12	45 x 56	5 " 5 "	2	1175	
10	1600-2200	7500	.64	20 x 12	52 x 68	5 " 5 "	2	1800	
12	2000-3000	10500	.88	24 x 14	64 x 72	6 "	2 3-8 "	2480	
15	3000-5000	16500	1.20	30 x 16	77 x 102	6 " 6 "	3 1-4 "	4570	
18	5000-7000	22000	1.80	36 x 18	98 x 126	7 "	3 3-4 "	6800	
22	7000-10000	35000	1.90	48 x 18	122 x 156	7 " 6 "	5	9800	1

ertical Closed Whirler Centrifugal Pump

Fig. **1558,** Closed Whirler Centrifugal Pump, is for use in a well or pit by being mounted on bers so it can be raised or lowered. Its suction has a check valve in the elbow which maintains priming of pump when placed above water level, permiting pumping tubular wells in which water es within suction distance—a very important feature for rice field irrigation and like uses. The ings and joints are turned, and it is a better pump than the regular centrifugal, it being more omical in power required. It will pump muddy and sandy water and gravel, and stones pass

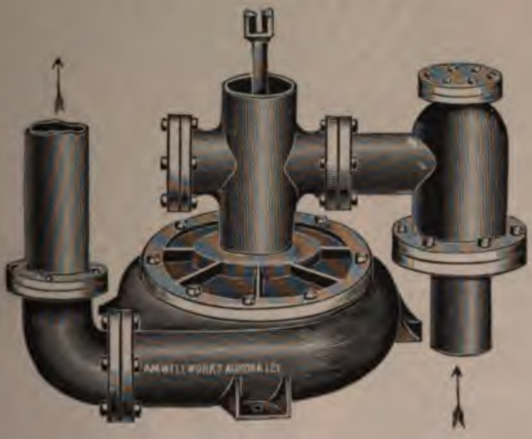


Fig. 1558.

ugh without damage. It is driven with vertical pulley by twisting the belt, and where pump is er down, shafting is extended to pulley above and held in place by cross bars on pump supporting bers.

Furnished. Each pump is furnished with 10 feet of shafting, a 12 x 12 inch belt pulley and one ring. More shafting will be furnished at an additional price.

ice Fig. 1558 Pump, **6 inch** discharge...**$310.00**

Centrifugal Pump Speed Table.

EVOLUTIONS PER MINUTE SHOULD RUN TO RAISE WATER GIVEN HEIGHT

No. ump.	Feet Lift. 5	10	15	20	25	30	35	40	50
½	426	603	740	850	955	1046	1130	1211	1350
¾	341	484	592	683	765	837	905	977	1081
	323	460	564	650	727	796	886	920	1028
½	314	446	546	630	705	772	835	892	997
	300	426	521	602	660	737	796	852	952
	283	398	480	557	621	693	752	808	895
	250	357	437	505	565	619	692	715	800
	215	300	370	426	485	522	562	609	675
	182	258	316	365	408	447	483	518	577
	168	237	291	336	375	411	443	475	531
	133	189	231	267	300	327	353	378	423
	108	154	189	216	242	266	287	307	343
	92	135	160	180	203	231	246	277	304
	80	112	139	160	178	197	212	227	253

PUMPING WIND MILL HEAD.

This Picture is the Rev
of the Mill itself.

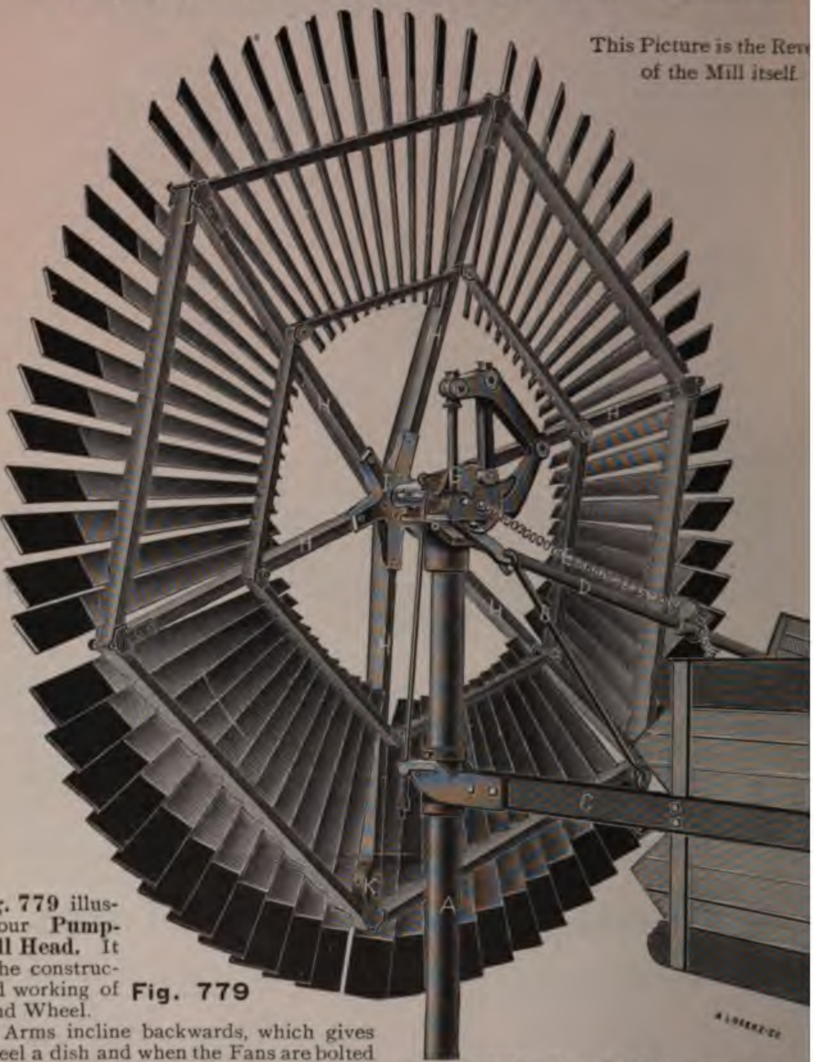


Fig. 779

Fig. 779 illustrates our **Pumping Mill Head.** It shows the construction and working of the Wind Wheel.

The Arms incline backwards, which gives the Wheel a dish and when the Fans are bolted on, as shown in picture, it makes a very strong, substantial Wheel, and it is impossible for become loose. Notice that the Governing Staff is opposite to the Rudder Staff E. in Fig. will serve to better illustrate the powerful and noiseless leverage we have for pumping, as motion is produced by the Crank when it is fartherest from the Pivot of the Lever, hence it is much slower than the down motion, and makes it very suitable for pumping deep w especially tubular wells. This will enable the water to be a longer time running in, and h more water and do its work much easier. The artist has made a mistake in making this pic has made it left handed. The Mill is reverse to what is shown in picture. The true po shown by Fig. 599.

PRICES OF ADVANCE WOOD MILLS.

Nos. 1 to 5 reduced sixty per cent. R. R. Mills to a proportion from old list.

NO.	STROKE.	DIAMETER.	WEIGHT.	PRICE.
1	4 to 6	8 feet.	400 lbs.	$36.00
2	4 to 6	9 "	450 lbs.	38 00
3	4 to 9	10 "	475 lbs.	40 00
4	4 to 9	12 "	750 lbs.	52 00
5	4 to 9	13 "	870 lbs.	56 00
7	4 to 13	14 "	1400 lbs.	80.00
8	6 to 18	19 "	1800 lbs.	110 00

HE AMERICAN WELL WORKS ADVANCE WIND MILL.

e furnish with each Wind Mill, 30
of Pump Rods and a set of Brack-
. The Wood Derrick is not furnish-
nless ordered.

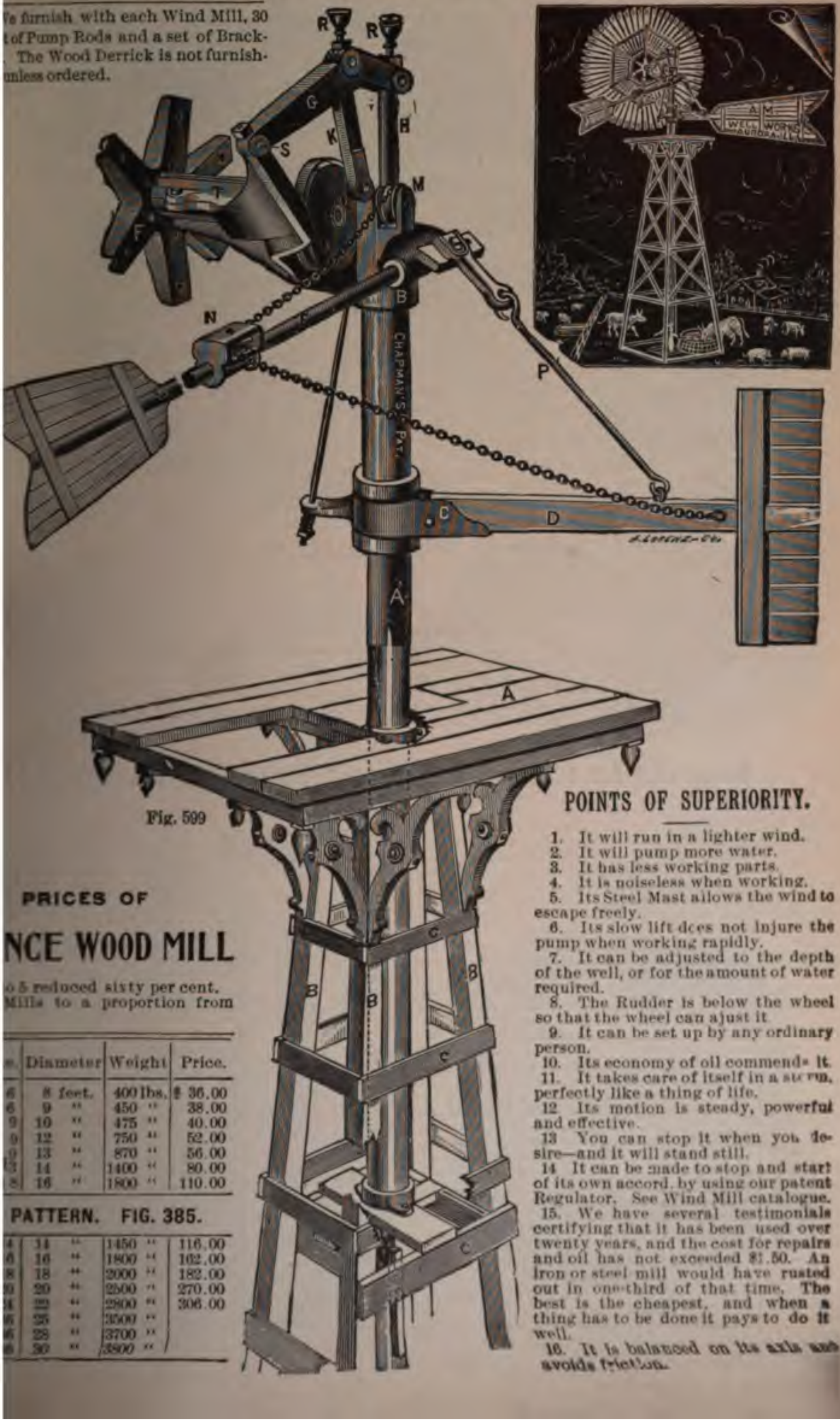


Fig. 599

PRICES OF

NCE WOOD MILL

o 5 reduced sixty per cent.
Mills to a proportion from

e.	Diameter	Weight	Price.
6	8 feet.	400 lbs.	$ 36.00
6	9 "	450 "	38.00
9	10 "	475 "	40.00
9	12 "	750 "	52.00
9	13 "	870 "	56.00
3	14 "	1400 "	80.00
8	16 "	1800 "	110.00

PATTERN. FIG. 385.

4	14 "	1450 "	116.00
6	16 "	1800 "	162.00
8	18 "	2000 "	182.00
0	20 "	2500 "	270.00
4	22 "	2800 "	306.00
6	25 "	3500 "	
6	28 "	3700 "	
6	30 "	3800 "	

POINTS OF SUPERIORITY.

1. It will run in a lighter wind.
2. It will pump more water.
3. It has less working parts.
4. It is noiseless when working.
5. Its Steel Mast allows the wind to escape freely.
6. Its slow lift does not injure the pump when working rapidly.
7. It can be adjusted to the depth of the well, or for the amount of water required.
8. The Rudder is below the wheel so that the wheel can ajust it
9. It can be set up by any ordinary person.
10. Its economy of oil commends it.
11. It takes care of itself in a storm, perfectly like a thing of life.
12. Its motion is steady, powerful and effective.
13. You can stop it when you desire—and it will stand still.
14. It can be made to stop and start of its own accord, by using our patent Regulator. See Wind Mill catalogue.
15. We have several testimonials certifying that it has been used over twenty years, and the cost for repairs and oil has not exceeded $1.50. An iron or steel mill would have rusted out in one-third of that time. The best is the cheapest, and when a thing has to be done it pays to do it well.
16. It is balanced on its axle and avoids friction.

THE AMERICAN ADVANCE.

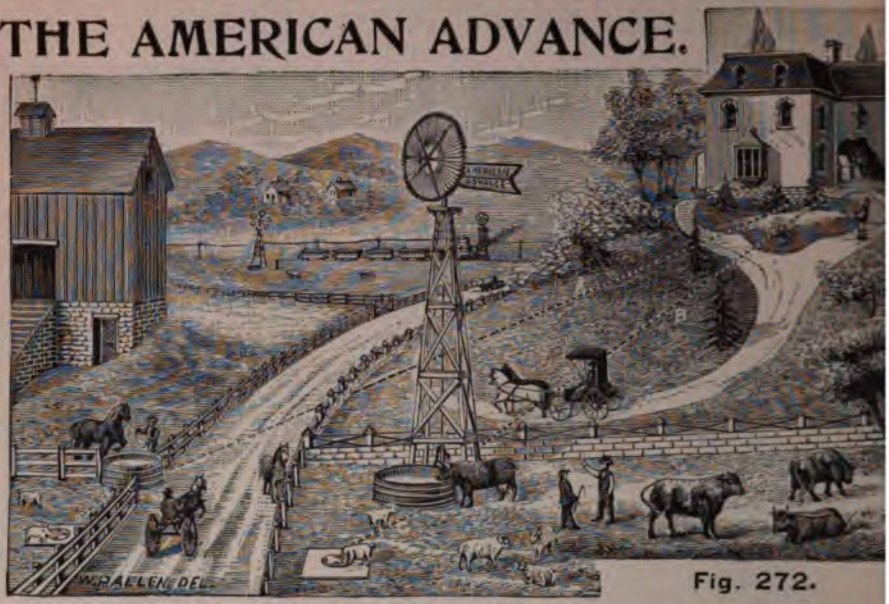


Fig. 272.

THE CHAPMAN WIND MILL WATER WORKS.

This picture illustrates our Wind Mill Water Works. The Wind Engine is connected to our Fig. 10 Pump. The Mill is set to work by simply throwing it into gear. Being connected to the pump, the water veyed through pipe (as seen by dotted lines) to the tank in the kitchen at the house. After this tank is fill water runs into the stock tank and hog and sheep waterer, filling them all—and then the mill stops, so as waste water or wear itself out, or make any unnecessary mud by the trampling of stock around the tank.

Question.—How does your Wind Engine stop itself?

Answer.—Each tank is provided with a Float Valve that shuts off the supply of water when filled, Safety Valve in the pump opens by the extra pressure and discharges the water into a pail that is connec the Shut-Off of the Wind Mill, and its weight then stops the Mill.

Q.—How do you start it pumping again?

A.—It starts itself.

Price List for Parts of the Advance Windmill—Figs. 599, 779.

(The letters referred to are on Fig. 599.)

Size of Mill—Feet	8	9	10	12	13	14
Price of Mast A	$ 3.75	$ 4.00	$ 4.40	$ 5.00	$ 5.00	$10.00
" Main Iron Frame B with top Bx T	7.00	7.50	8.40	10.00	12.00	19.00
" Tail Staff, Irons C, each	1.40	1.50	1.60	2.00	2.40	3.20
" Tail Staff, Wood, D	2.50	2.63	3.00	3.50	4.00	5.00
" Tail Fan and Staff, complete	6.50	8.00	11.00	13.00	14.00	18.00
" Side Vane Pipe, E	0.80	0.90	1.00	1.40	1.60	1.80
" Side Vane Fan, L	1.30	1.40	1.60	2.00	2.30	3.00
" Iron Hubs or Spider, F	2.50	3.20	4.00	4.50	6.00	7.00
" Brace Spider	....	....	....	1.20	1.40	2.00
" Walking Beam, G	1.75	2.00	2.25	2.50	3.00	4.50
" Pump Rod, H	1.65	1.75	1.90	2.25	3.00	4.50
" Wrist Pin	1.25	1.25	1.25	1.25	2.10	3.00
" Face Plate	1.60	1.60	2.10	2.50	3.00	4.50
" Pitman, K	1.25	1.25	1.70	2.00	2.40	3.00
" Pulley M	0.45	0.45	0.45	0.45	0.45	0.60
" Pulley Block N and Pulley	1.20	1.20	1.20	1.20	1.20	1.20
" Chain, full length	0.55	0.65	0.75	0.90	0.90	1.15
" Shaft	3.00	3.00	3.30	3.80	4.20	5.00
" One Complete Fan Section, full length	2.75	2.90	3.00	4.50	5.00	6.00
" Single Fan, full length	0.08	0.08	0.09	0.12	0.15	0.24
" Single Arm	0.60	0.65	0.75	0.90	1.05	1.20
" Brake Band on Face Plate	0.70	0.70	0.80	1.00	1.10	1.60
" Cap Box, T.	....	....	1.50	1.50	1.75	2.50
" Brake Box and Spring	0.50	0.50	0.60	0.60	0.70	0.90
" Mast Step or Foot Casting	0.75	0.75	0.90	1.10	1.20	1.40
" Mast Collar with Set Screw	1.10	1.10	1.20	1.20	1.20	1.50
" Swivel Joint, connects Pump Rod H, compl.	1.50	1.50	1.75	1.75	1.75	2.25
" Pump Rod Slide to connect Pump	0.40	0.40	0.50	0.50	0.50	0.65
" Clips for Fast. Outside of Fan to Arm, Per Set	0.45	0.45	0.60	0.60	0.60	0.75
" " " " Inside " " "	0.30	0.30	0.40	0.40	0.40	6.50
" Arm Weight	0.40	0.40	0.50	0.50	0.60	0.90
" Hinge Bolt, S.	0.70	0.70	0.80	0.80	0.80	1.10
" Brace	....	....	....	0.30	0.40	0.50

Stock and Storage Tanks.

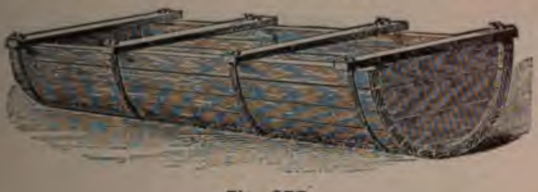


Fig. 377.

Fig. 377 is a Tank for stock drinking purposes. It is hooped like a round tank, excepting that hoops are drawn tight with bolts, which pass through the pieces which cross the tank. This tank ay be tightened up at any time. It is made in lengths 8, 12 or 16 feet long, 2½ feet high. It will ld one barrel of water for each foot in length.

Price for **Fig. 377** tank, **8** feet long .... **$14.**
" " " " " **12** " " .... **19.**
" " " " " **16** " " .... **26.**

PRICES FIGS. 376 AND 1356 ROUND TANKS.

MADE OF TWO INCH STOCK.

Length Stave in Feet.	Diameter Bottom in Feet.	Number Hoops.	Capacity Gallons	Approx Weight in Pounds	Price with Drive Hoops.	Price with Lug Hoops.
2	6	2	280	275	$11.00	$11.75
2¼	6	2	310	325	12.50	13.50
6	4	5	425	400	15.25	17.00
2	8	2	514	425	16.50	17.50
4	6	4	644	450	18.00	19.50
2¼	8	2	600	475	18.50	19.50
2	10	2	818	600	23.50	25.00
5	6	4	839	525	20.50	22.00
6	6	5	1,025	700	24.00	26.00
2¼	10	2	960	700	25.50	27.00
5	7	4	1.163	700	25.00	27.00
7	6	6	1,212	750	28.00	31.00
8	6	7	1,325	850	31.50	34.00
6	7	5	1,422	800	29.00	31.50
2¼	12	3	1,400	900	35.00	37.00
7	7	6	1,680	900	33.00	36 00
10	6	8	1,760	950	37.50	41.00
6	8	5	1,883	900	34.00	36.50
8	7	7	1,939	950	37.00	40.00
2¼	14	3	1,900	1,200	44.00	46.00
7	8	6	2,226	1,000	39.00	42.00
6	9	5	2,410	1,050	40.00	43.00
10	7	8	2,456	1,250	44.00	48.00
8	8	7	2,569	1,200	43.50	47.00
10	8	8	3,254	1,500	52.50	57.00
8	9	7	3.286	1,450	51.00	55.00
12	8	9	3,938	1,750	60.50	66.00
8	10	7	4,092	1,700	57.00	61.00
10	9	8	4.162	1,700	59.50	65.00
12	9	9	5,039	1,950	69.00	75.00
10	10	8	5,109	1,900	67.50	72.00

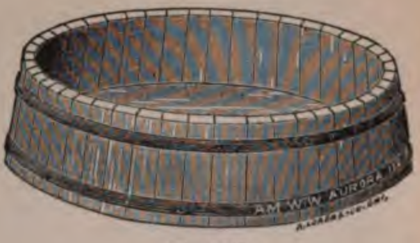

AM WELL WORKS AURORA ILL

Fig. 376.

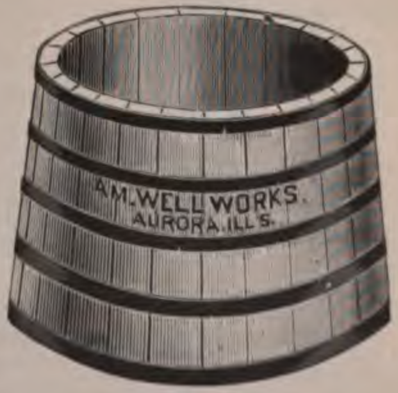

AM. WELL WORKS.
AURORA, ILL'S.

Fig. 1356

Water Tank Trimmings.

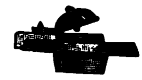


FIG. 6, Tank Check Valve.

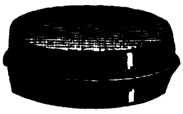


FIG. 7, Copper Tank Float for operating Figs. 8. 9, or 66. Price 9½ inches Diam..**$1.10**

FIG. 9 is to be screwed on to a
coming into the tank at the

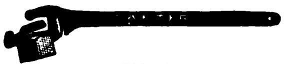


FIG. 8.
Tank Valve Float.

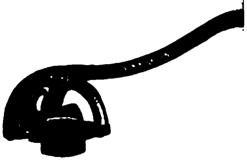


FIG. 66.
Tank Float and Outlet Valve.

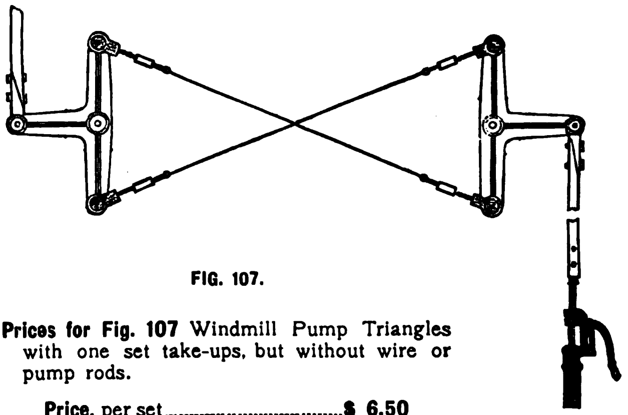


FIG. 107.

Prices for Fig. 107 Windmill Pump Triangles with one set take-ups, but without wire or pump rods.

Price, per set..**$ 6.50**
" " " extra heavy.............. **10.00**

PRICES FOR FIGS. 6, 8, 9 AND 66 TANK CHECK AND OUTLET VALVE.

Pipe size in inches they screw to	¾	1	1¼	1½	2
Price, Figs. 8 or **9** of iron	$........	$ .65	$........	$........	$.....
" " **6** " "	.60	.65	.75	.75	1.2
" " **66** " "	....	1.00	1 20	1.00	1.9

TANK HOOP LUGS FOR WOODEN TANKS.

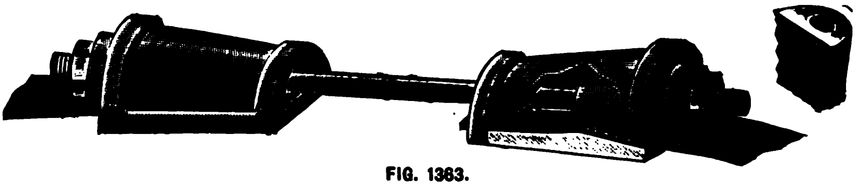
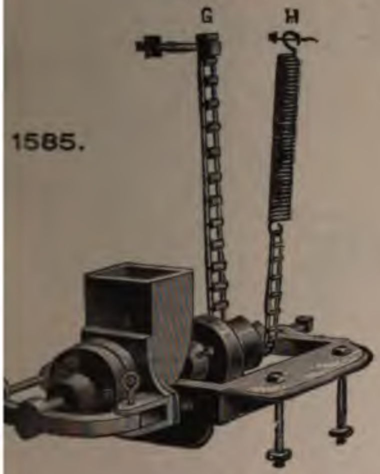


FIG. 1363.

PRICES FOR ONE SET FIG. 1363 TANK HOOP LUG WITH BOLT.

Size Hoop for, Inches	1⅛	1¼	2	2½	3	3
Price Fig. 1363 Tank Draw Lug and Bolt	$ .35	$ .45	$ .50	$ .70	$ .90	$1.

FEED GRINDERS.



1585.

Fig. 1585, is an illustration of a small Feed Mill Grinder to be operated by the ordinary pumping windmill, grinds from ½ to 1½ bushels per hour.

◆

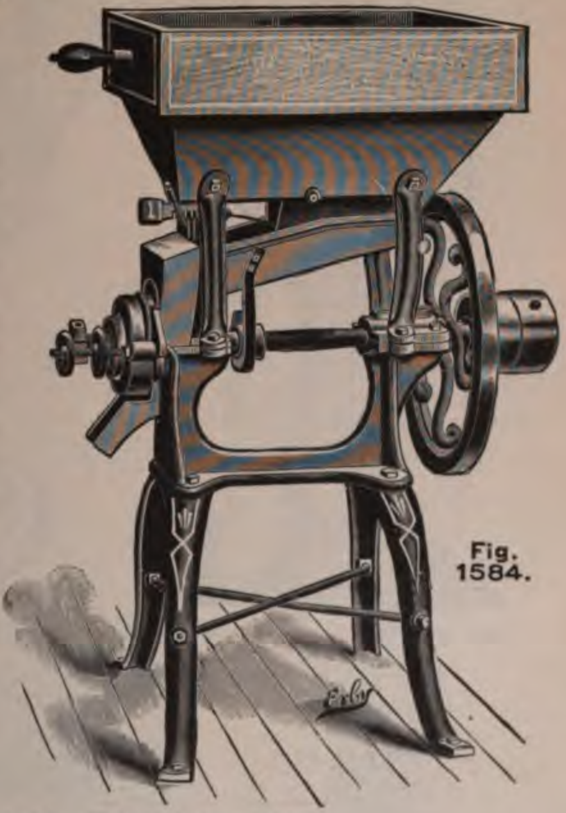


Fig. 1584.

. 1584. illustrates our Feed
nder to be operated by belt
We can also furnish it
horse power.
fully guaranteed, and will
o responsible parties on 10
al. We make this grinder
izes. The No. 1 Medium
ch rings and 6-inch pulley;
1 Warehouse has 7-inch
d 8-inch pulley. Capacity
edium, 20 to 25 bushels per
ith 4 to 6 horse power;
arehouse, 30 to 40 bushels
r, with 6 to 8 horse power.
quired, 800 to 1,000 revolu-
minute.
rn Driving Attachment for
hurn by pumping windmill
shown in Fig. 1585.

LIST PRICES FIGS. 1584—1585.

4—Belt Power, medium size	$25.00
4—Horse Power, medium size	27.00
4—Belt Power, Warehouse size	25.06
5—Pumping Mill Grinder	15.00
Price for Churn Driving attachment	$12.C0

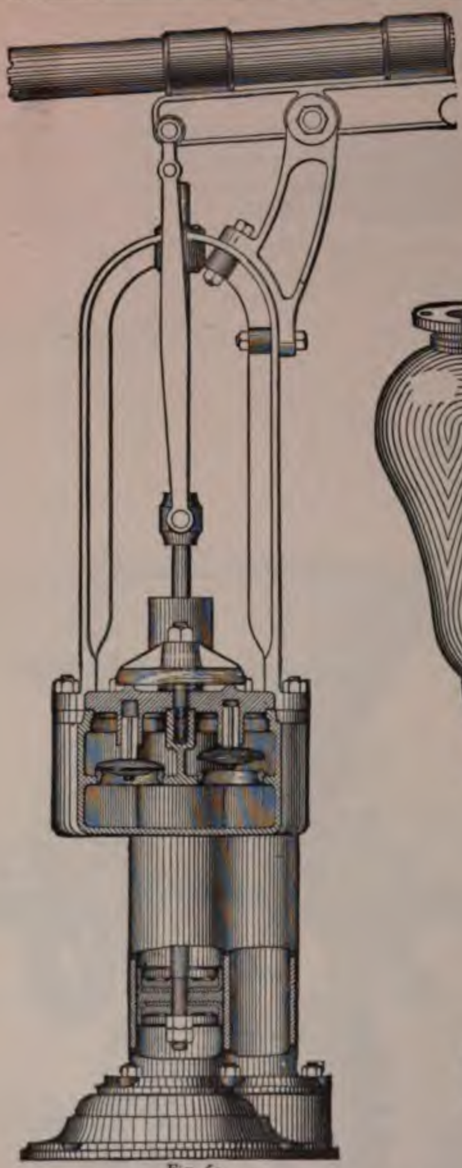


Fig. 60.

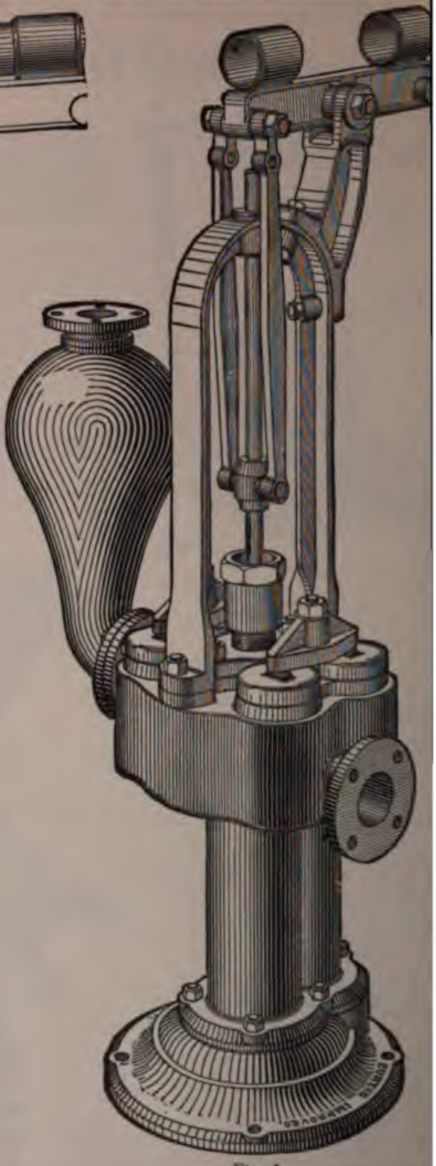


Fig. 61.

RAILROAD WIND PUMPS.

Prices given are for Hand and Power Pumps, with air chamber on the discharge.

Supply Air Chambers extra.

Calibre of the Pump Cylinder in inches.	Length of Stroke in inches.	No. Strokes per minute. Two Strokes per revolution.	Water discharged per minute in gallons.	Size of Suction Pipe in inches.	Size of Discharge Pipe in inches.	Diameter of Suction Pipe Flange in inches.	Diameter of Discharge Pipe Flange in inches.	Pr I Cy d
3	12	120	45	1¼	1¼	5	5	$4
3	15	110	50	1½	1½	5	5	50
4	12	100	66	2½	2	5¾	5¾	60
4	18	90	88	2½	2	5¾	5¾	70
5	12	90	90	3	3	7	7	75
5	15	88	111	3	3	7	7	80
5	18	86	135	3	3	7	7	90
6	15	86	157	4	4	8½	8½	115
6	[illegible]	80	185	4	4	8½	8½	12

CHAPMAN'S

ning and Sinking Pumps,

r Removing Water from Wells or Shafts as they are being Sunk.

. **823** illustrates our Mining and Sinking Pump. ecially designed for pumping dirty and muddy rom a shaft as it is being sunk, as each valve can be cleaned after stopping and letting sand and mud settle upon them. The Piston forces the water up at the down stroke, and draws it in at the up stroke; it can be packed from the outside. A suction hose 25 feet long should be connected to it. This hose has a coil of wire in it to prevent its collapsing, and can be moved about the shaft to suit the convenience of the workmen. It can be driven by a walking beam, a crank or with our steam pump Fig. 884. Timbers are best for pump rods. Length of stroke 3 feet.

Fig. 824 is very similar to Fig. 823 in the arrangement of its valves. It lifts the water at the up stroke with a Bucket Valve working in a cylinder. It is used for pumping water from coal mines and deep cpen wells. Stroke of the pump is 3 feet.

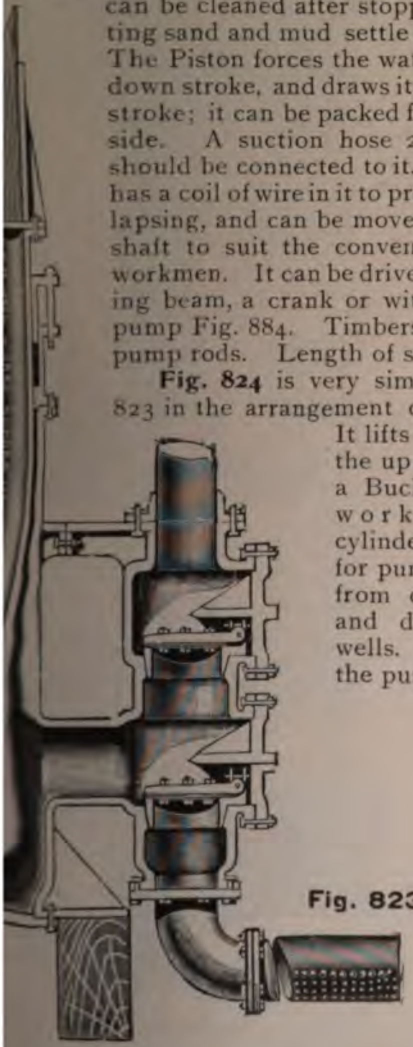


Fig. 823.

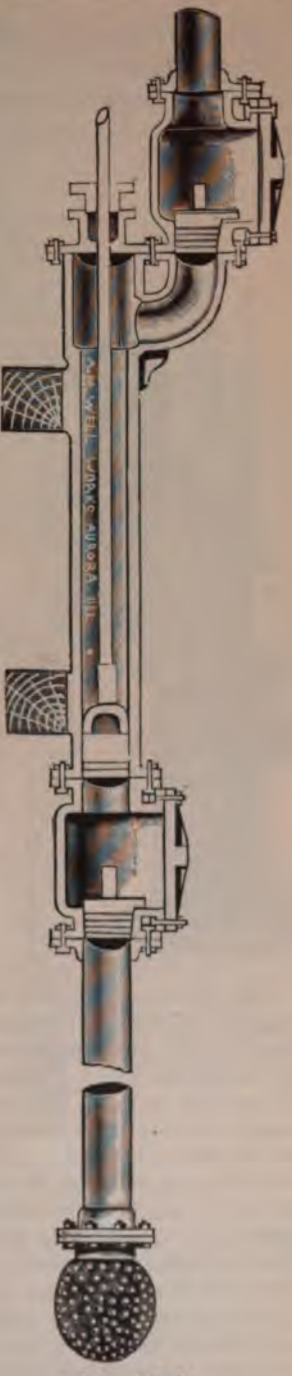


Fig. 824.

ches Cylinder or Piston...............	2	2¼	3	3½	4	4½	5	6	8	10	12	16
. 823 or 824..............................	$	$	$	$	$80.	$90.	$110.	$140.	$175.	$210.	$250.	$350.

Fig. 394 illustrates a **SYPHON PUMP.** It is designed to be placed in a well fr to 25 feet of the water. When the plunger is lifted up, it draws the water in, and wh goes down, it forces the water above. The inlet being on the top of the cylinder, th part will be always filled with water, and is self-priming.

PRICES FIG. 394.

2	in. Cylinder, 1	in. suction and discharge	..............$
3	" 1¼	" "	....
4	" 2	" "	....

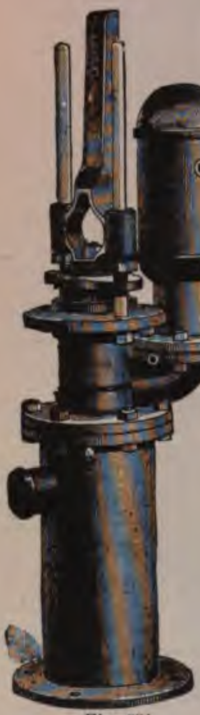


Fig. 394.

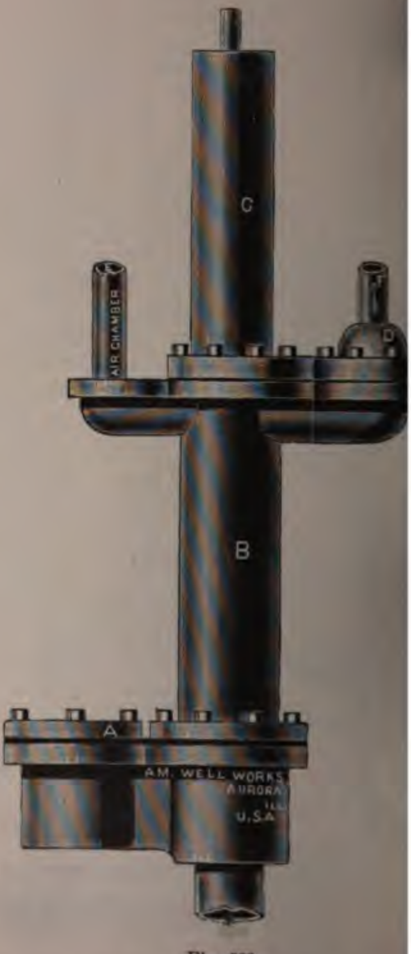


Fig. 580.

Fig. 580 is a deep well double acting cylinder. It is placed in open wells or pits near the water, two pipes extend down from the base of the pump to the chamber as shown by E and F. The valves are arranged outside of the cylinder so that they can be repaired without removing the pump from the well or taking it apart. By removing the cap A, the bottom valve can be repaired, or by removing the cap D, the upper valve can be repaired. The plunger is repaired by removing the cap and cylinder C, and disconnecting the pump rod. This is very handy for use in deep open wells. By its use, the labor is saved of lifting the pump in and out when repairs are necessary. principle is this: the cylinder B has a plunger in it that is twice as large as the cy C; the pump rod is raised, operating plungers in C and B; the plunger in B being tw large as the plunger in C, will pump one-half more water than would fill C; this for *through F; on the downward* stroke, the water in the cylinder C is forced up F, makin *double acting force pump.*

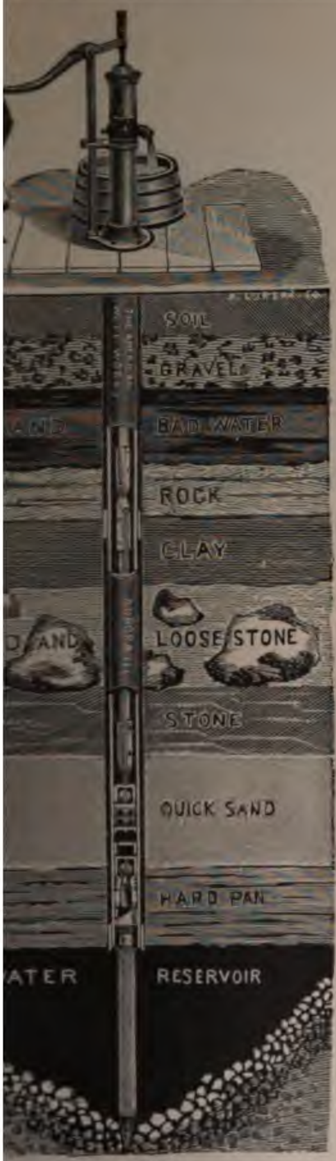


Fig. 395 is an imaginary section illustrating the well, water course, earth penetrated and child pumping. This pump is specially constructed to pump more easily than the ordinary pump. It has an adjustable stroke attachment, so power to pump can be increased or diminished. Thus, if we change the fulcrum of the pump so it only raises four inches, the power required to pump will be one-third as great as it would be if the stroke of pump was 12 inches. This feature belongs to us.

The well screen through which the water is filtered has special features which make it more durable than the ordinary screen. The cost will be a trifle higher but its durability amply repays for the increased outlay. In ordering these goods, order the best—always ask for slotted wire screen.

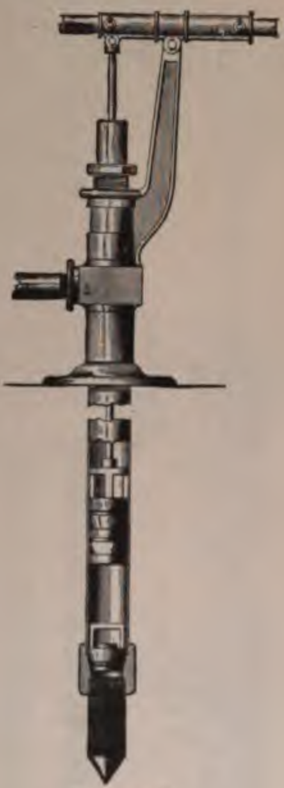


Fig. 395.

Fig. 520.

TOWN ARTESIAN FIRE PUMP, FIG. 520.

520 is our Town Artesian Fire Pump. It is made double acting to throw a steady stream of water
me time lift water from a deep well. It will raise water easier than any other pump that is capable
ater for fire use. The handle support and pump are very strong. The handle is wood, and runs
socket so that one or several men can work the pump. The valves can be removed out of the top for
The pump has a stroke of eighteen inches, and force plunger will be of brass. This is also a fine
mp. We can, if ordered, furnish a shackle on top to connect the windmill, and it can be instantly
. If there is a good wind, the windmill will answer for the motive power for extinguishing fire, and
lms, it can be operated by man power. It can also be used with any other motive power.

Price, Town Artesian Fire Pump Head only of FIG. 520.

or, inches	2	2½	3	3½	4	4½	5	6
roke, inches	12	12	12	15	15	18	18	18
Head only	$14.00	$18.00	$22.00	$	$30.00			
mill Shackle	2.00	2.50						

inder and Valve *pages for other parts.*

CHAPMAN'S I X L

Tubular Well Force Pu

WELL SINKERS' FRIEND.

Fig. 795 illustrates our Chapma
L Tubular Well Force Pump. W
designed many pumps but this
all for pumping Tube Wells. The
Stock is connected directly to th
Well, and of the same size, so t
well valves can be taken up for
without removing the Pump.

Fig. 795½ is a sectional view
Force and Displacement Cylinder
795. It consists of a Brass Cylin
serted into the pipe of the
when the last rod is on. It
loosely, but by turning the
the packing 23 is expanded
the sides of tube 5, and m
water tight joint. The sp
low the packing and betwe
Brass Cylinder and t
forms an air chambe

Operation.—Th
is drawn up by the
plunger valves, and
the water follows
plunger head 26, 27 and 28. On th
stroke the water is forced out by th
,a force pump and an equalize
delivery of the water. When th
valves need repairing, the handl
turned backwards, which turns the
and loosening the packing 23, the r
then drawn up from the well, the
that the first piston wo
removed with the rod
admits of the lower val
ing drawn out without
ing the pump. Patents
for.

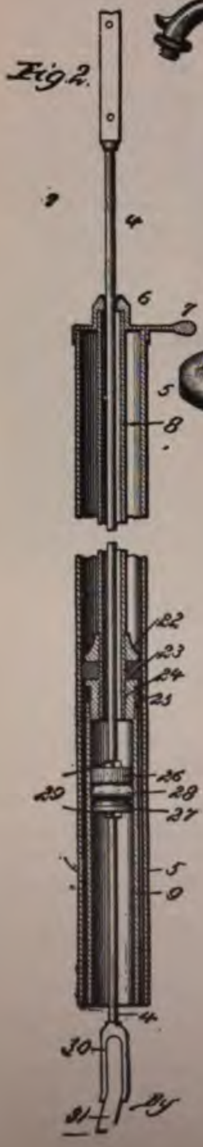
The Vent Closer is
Valve for discharg
water when the Pump
ped by raising the han
freezing prevented. T
that would run away w
vent is saved.

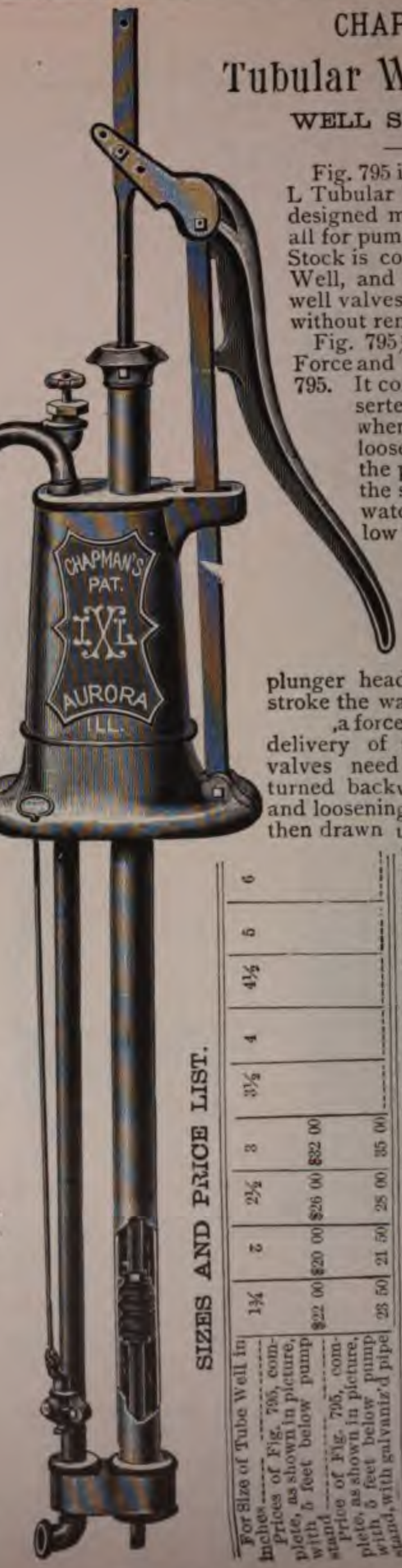
We make these P
galvanized or plain
pipe, so as to correspo
the pipe the well is ma

**3½inch Pumps,or
have our Adjustab
ble handle, so that
more men can w
Pump in case of fi**
Fig. 61.)

This Pump is mad
used with any style
Well Cylinder.

The Common Cyli
also be used, as the
very strong.



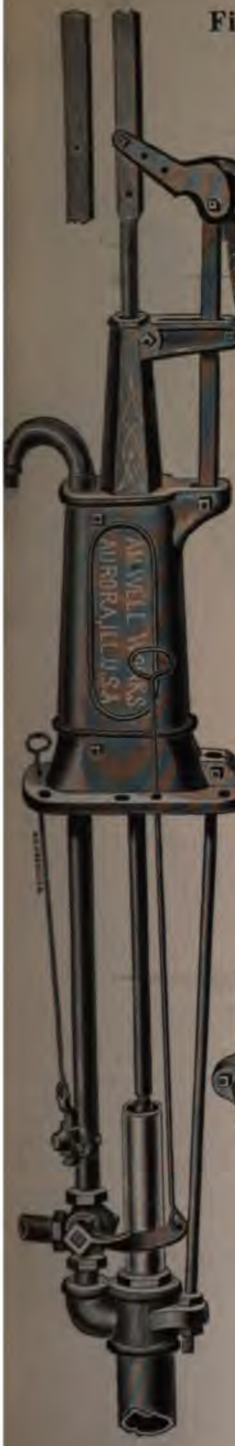


SIZES AND PRICE LIST.

For Size of Tube Well in Inches	1¼	2	2½	3	3½	4	4½	5	6
Prices of Fig. 795, complete, as shown in picture, with 5 feet below pump stand	$22 00	$20 00	$26 00	$32 00					
Price of Fig. 795, complete, as shown in picture, with 5 feet below pump stand, with galvaniz'd pipe	23 50	21 50	28 00	35 00					

Fig. 768 illustrates our Improved Tubular Well Force Pump, which we make in with the following changes:

Fig. 768.


AM. WELL WORKS AURORA, ILL.
AM. WELL WORKS AURORA, ILL. U.S.A.

We make it as a Double Acting Force Pump, with a 3-way and Vent Closer as shown, in place of the three-way cock as shown here, we make it as shown by Fig. 767. The Vent Closer is a small instrument used to stop the discharge of the water at the vent by pushing the handle down, by pulling it up the water is discharged from the pipe to prevent freezing, this connects to tubular well pipes, and the stuffing box can be screwed out so the valves can be drawn out without removing the pump.

Fig 769 illustrates our Vent Closer as shown, having a slide and packing, which is raised or lowered to cover the vent hole of the pipe.

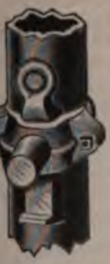


Fig. 769.
VENT CLOSER.

In place of the double acting part, we furnish a Stuffing Box.

For size of pipe it connects to in inches	1¼	2	2½	3
Price for Fig. 768 without 3-way cock, but with Vent Closer and double discharge	$13 00	$13 00	$15 00	$18 00
Price of Fig. 768 as shown, or with the Hydrant Cock as shown by Fig. 767, with Vent Closer and double discharge	15 00	15 00	17 00	20 00
Price of Fig. 768 as shown with Safety or Check Valve	17 00	17 00	19 00	22 00
Fig. 769 Vent Closer	80	1 00	1 20	1 50

Chapman's Improved Tubular Well Pump Heads.

FIG. 701 is a combined head and base only. The main tube of well is allowed to extend up two feet. The base is set over the pipe and dropped to the platform and head is screwed to top of pipe, making a most durable Tubular Well Pump, as it is simple, plain and strong.

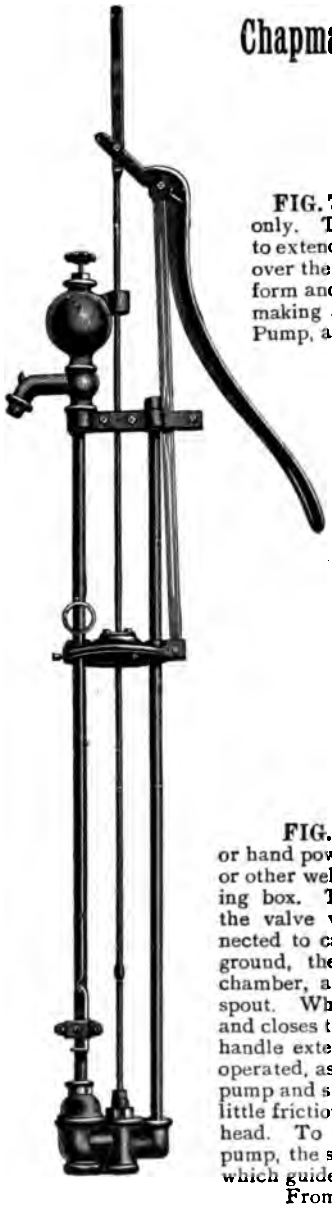


Fig. 102 A.

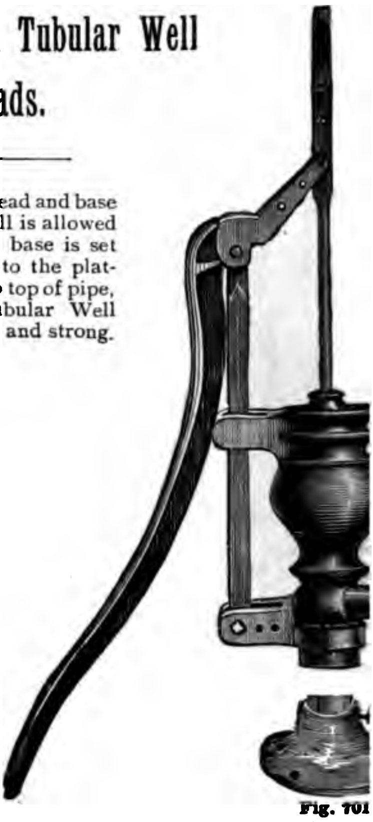


Fig. 701

FIG. 102 A is a 3-Way Wrought Iron Force Pump for w or hand power, made of galvanized or plain pipe, and is suitable for or other wells, and arranged so well valves can be withdrawn throug ing box. The rod passing through the air chamber raises and the valve which is in the bottom of Tee head where a pipe nected to carry the water away under ground. To conduct wate ground, the valve is raised and rests against pipe connected chamber, and that stops the water from coming up and running spout. When it is desired to bring the water up, the valve is seated and closes the underground outlet. The frost vent closer is operated handle extending through the base of the pump. This pump is operated, as the fulcrum which supports the handle connects with pump and swings thereon, carrying plunger rod straight with compa little friction. For preventing rust, we use a brass plunger in head. To remove lower valves from bottom of well without re pump, the stuffing box is unscrewed, the cap on base removed, and which guide the rod are taken off.

From bottom of base to bottom of box is 5 feet. The outlet i below frost.

Prices, Fig. 102 A and Fig. 701 Pumps.

Size Well Pipe screws to, in inches	1¼	1½	2	2½	3	3½	4
FIG. 102 A as shown, plain pipe, two deliveries	$14.00	$14.00	$14.00	$16.00	$18.00	$	$
FIG. 102 A same as last but Galv. pipe	15.50	15.50	15.50	18.00	20.00		
FIG. 701, Common, 6 to 10 inch stroke			6.00	7.00	10.00		
FIG. 701, Force, 6 to 10 *inch stroke*			9.50	13.00	16.00		

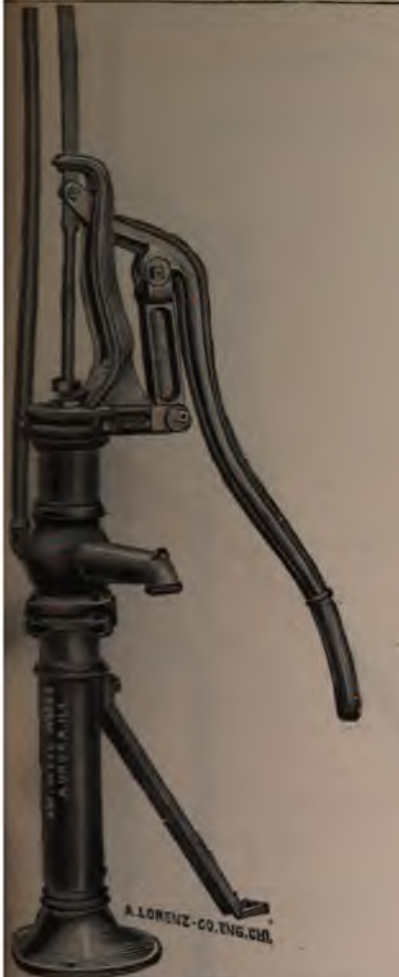

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Fig. 52.

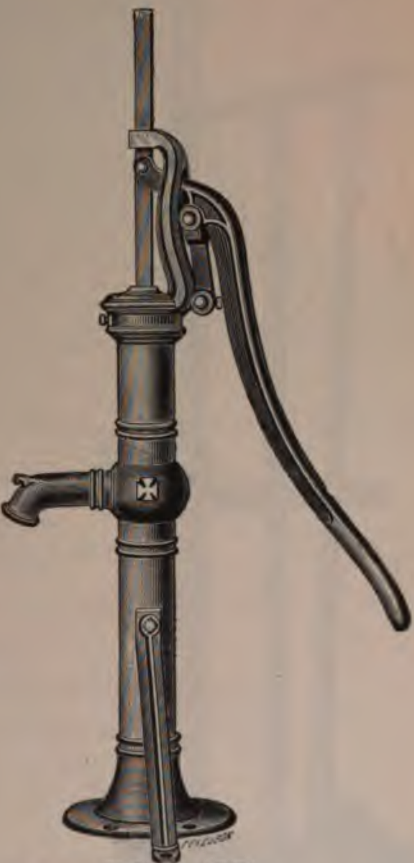


Fig. 57.

Fig. 52 illustrates one of our **Tubular Well Force Pumps** for pumping tubular wells. ay also be used with Fig. 1383 Cylinder or a common cylinder. It screws to well pipe up r the spout, and takes apart at spout so valves may be withdrawn for releathering ut unscrewing pump, when used on tubular well. It has an outlet at the back for forcing er to elevated tank by placing stop clamp over spout.

Fig. 57 when tapped 2 or 2½ inch, is a TUBULAR WELL PUMP HEAD, permitting valves e drawn out at top for releathering.

Fig. 57 when tapped 1¼ or 1½ inch, is a hang-in pump head, using Fig. 1383 cylinder for high and common light cylinder for low lift.

Fig. 57 is heavy, well made, and durable.

The water cylinder pipe and rods are not included in prices.

Reduced Prices Figs. 52 and 57 Heavy Pump Heads.

ber of Pump	1	2	3	4	5	6
Pipe screws to, In.	1¼	1½	2	2½	3	4
52, Common, **6** inch Stroke	$6.50	$6.60	$6.70	$ 8.00	$ 9.00	$
" Common, **10** " "	7.00	7.10	7.30	8.70	9.80	
" Force, **6** " "	7.75	7.90	8.00	9.40	10.50	
" Force, **10** " "	8.25	8.40	8.60	10.10	11.30	
57, Common, **6** " "	3.60	3.70	3.80	5.00	......	
" Common, **10** " "	4.10	4.20	4.30	5.60	......	

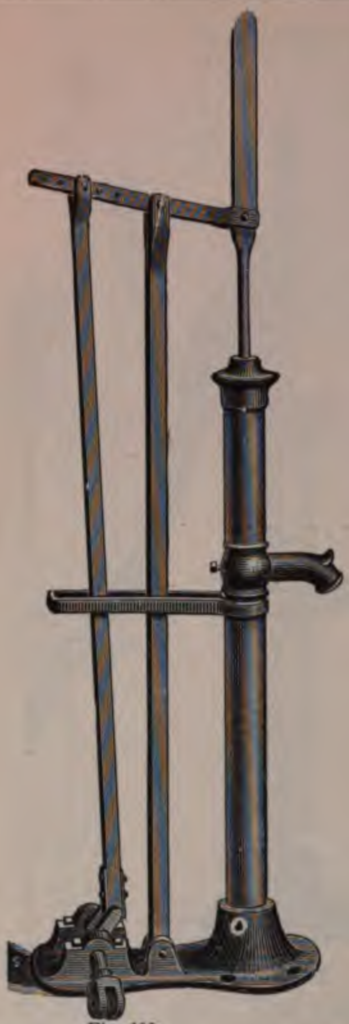


Fig. 106.

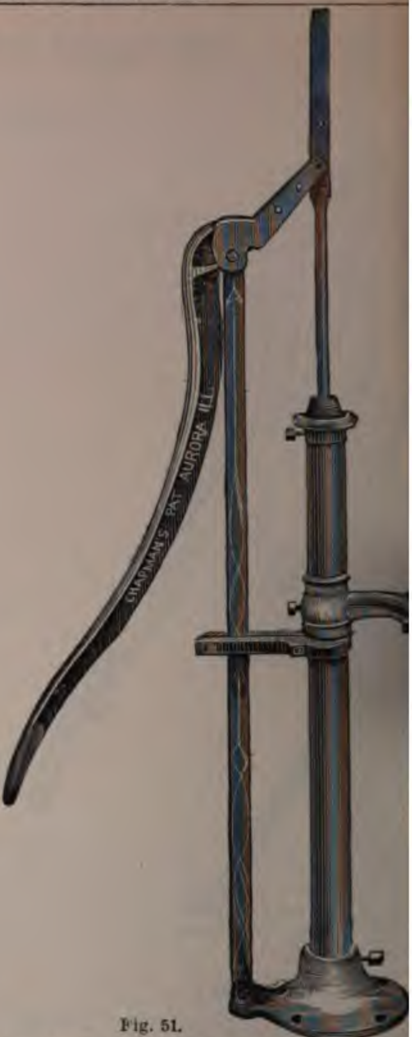

CHAPMAN'S PAT AURORA ILL.

Fig. 51.

WROUGHT IRON, HAND, WIND AND HORSE POWER, TUBULAR WELL PUMPS.

FIG. 106 illustrates an entirely new arrangement for a hand, horse-power and w
pump. The handle is adjustable. When this pump is used by wind power, horse power
connected. When it is desired to use the horse power, detach the windmill and conn
tumbling rod with the knuckle on base of pump.

This pump meets a long felt want as a reliable pump for dairy purposes and stock u
railroad and fire purposes.

FIG. 51, Adjustable stroke, from 6 to 12 inches. Made of a superior quality of la
wrought iron pipe. The handle bearer is nearly four feet in length and swings from base u
carrying rod perpendicular. This pump is simple, durable and strong. It is sold at a lo

Prices Fig. 106 and Fig. 51 Pumps.

Diameter pipe screws to	2	2½	3	
FIG. 106 of Plain Pipe	$30.00	$38.00	$48.00	$7
FIG. 106 of Galv. Pipe	33.00	42.00	54.00	8
FIG. 106 Force Pump (like Fig. 102, with Horse Power Attachment,)	40.00	50.00	64.00	10
FIG. 51 Common, Plain Pipe	9.00	10.00	12.00	2
FIG. 51 " Galv. Pipe	10.00	12.00	14.00	2
FIG. 51 Force, Plain Pipe	12.00	14.00	16.00	2
FIG. 51 *Force, Galv. Pipe*	14.00	16.00	19.00	2

Pump Repairs, Balls, Pipe Holder.

PRICES* OF REPAIRS FOR WELL PUMPS.

of Pump	51	52	57	102	106	701	768	795
[illegible]	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00	$2.00
[illegible]	2.00	4.00	....	2.00	4.00	1.80	6.00	5.00
[illegible]	1.50	.	....	1.50	1.50	....	....	....
[illegible]	2.00	3.00	....	4.00	2.00	3.00	2.00	2.25
(not Force Pump)	1.00	2.50	2.50	1.50	1.00	....	....	.60
Rod	1.50	1.00	1.00	1.50	2.00	1.50	1.60	2.00
Rod	2.00	2.00	1.00	3.00	2.00	1.50	4.00	4.00
[illegible]	1.50	....	4.50	....	2.50	....	...	..
charge Pipe	....	....	....	2.50	....	....	1.50	1.50
Vibrating Connecting Rod.	....	....	....	....	3.50	...	....	....
Crank	....	....	....	....	10.00	....	....	....
[illegible]	....	.90	.90	....	....	....	....	....
Tee Head Casting	....	....	....	3.00	....	...	....	3.00

*Prices here given are for sizes listed, **smaller than 3-in.** Those **3-in.** and larger are **25%** above ces in table.

Fig. 1166.

BRONZE BALLS FOR VALVES AND OTHER USES.

Made solid up to and including 1 15-16 inch.

Larger sizes listed are made hollow, but solid may be had at a small additional cost.

These balls are perfectly spherical and on a true seat are tight under extreme pressure.

Intermediate sizes take list of next larger size in table.

PRICES OF FIG. 1166, BRONZE BALLS.

ameter Bronze Balls	11-16	7-8	1 1-8	1 3-16	1 3-8	1 7-16	1 1-2	1 11-16	1 15-16	2 13-32	2 5-8
1286 or 1382 used in	1¼	1⅜	....	1¾	....	2¼	....	....	2¾	3¼	....
43 and 48 " "	....	..	....	2	....	2½	....	3	....	....	4
1542 " "	....	..	No. 1	....	Nos 2&3	....	No. 4				
ce, each	$ .35	$ .35	$ .35	$ .35	$ .45	$ .50	$ .60	$ .95	$1.25	$2.20	$2.90

BRONZE BALLS CONTINUED.

ameter Bronze Balls	2 7-8	3 13-32	3 9-16	4 3-4	5 3-16	5 31-32	6 1-16	6 31-32	7 1-4	9 5-8	10 1-2
1285 or 1382 used in	3¾	4¼	4¾	5¾	6½	7½	8	8½	9½	11½	12½
ce, each	$3.75	$5.40	$5.80	$8.30	$11.25	$15.50	$16.50	$25.00	$28.00	$36.00	$44.00

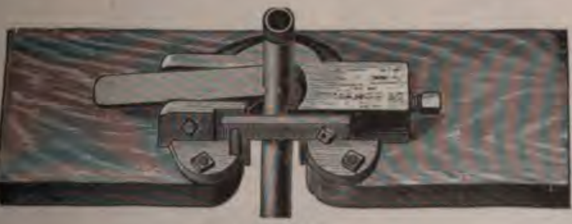


Fig. 1429.

Fig. 1429. Automatic Pipe Holder, is used for putting pipe for pumps into open wells. It may be ed in holding pipe, drill rods or many other things, as it grips at any point, and is easily released en ready. The block is adjustable so that each one will hold two sizes of pipe.

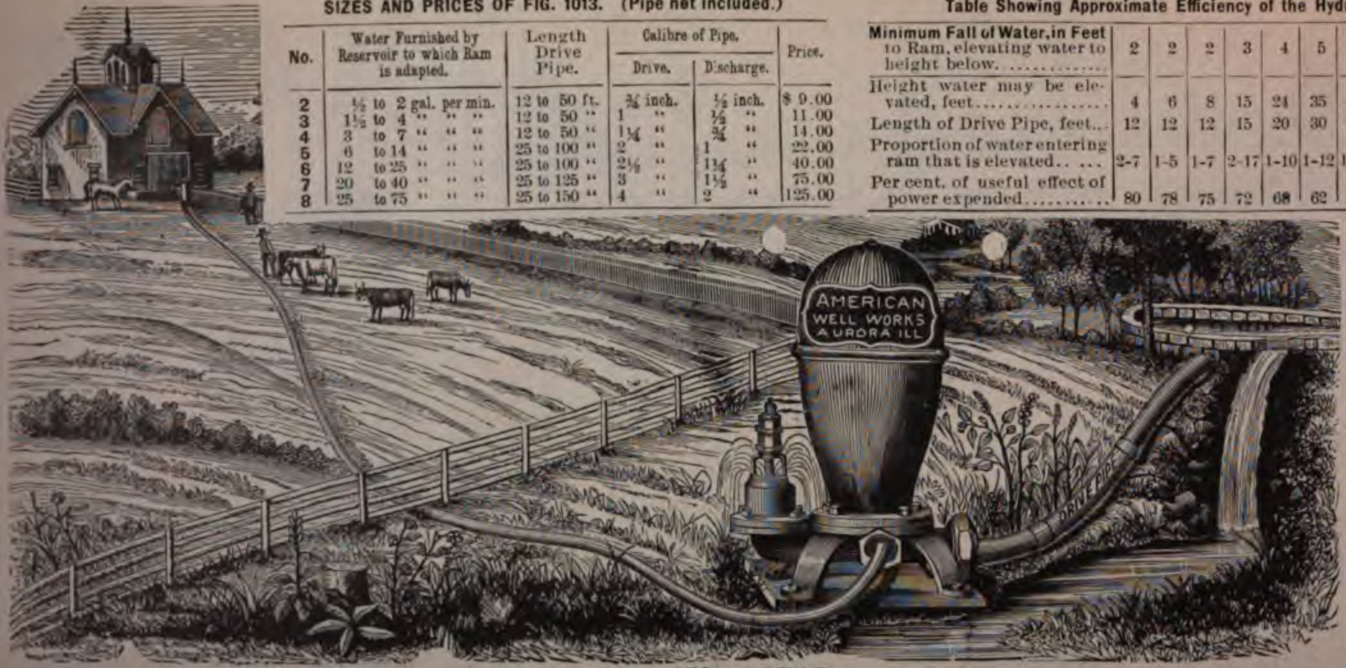
	Code.	Price.
No. 1 holds 1 and 1¼ inch pipe	Holdun	**$6.00**
" 2 " 1½ " 2 " "	Holdop	**9.50**

SIZES AND PRICES OF FIG. 1013. (Pipe net included.)

No.	Water Furnished by Reservoir to which Ram is adapted.	Length Drive Pipe.	Calibre of Pipe.		Price.
			Drive.	Discharge.	
2	½ to 2 gal. per min.	12 to 50 ft.	¾ inch.	½ inch.	$ 9.00
3	1½ to 4 " " "	12 to 50 "	1 "	½ "	11.00
4	3 to 7 " " "	12 to 50 "	1¼ "	¾ "	14.00
5	6 to 14 " " "	25 to 100 "	2 "	1 "	22.00
6	12 to 25 " " "	25 to 100 "	2½ "	1¼ "	40.00
7	20 to 40 " " "	25 to 125 "	3 "	1½ "	75.00
8	25 to 75 " " "	25 to 150 "	4 "	2 "	125.00

Table Showing Approximate Efficiency of the Hydraulic Ram.

Minimum Fall of Water, in Feet to Ram, elevating water to height below.	2	2	2	3	4	5	6	7	8	10	12
Height water may be elevated, feet	4	6	8	15	24	35	48	63	80	100	120
Length of Drive Pipe, feet	12	12	12	15	20	30	40	50	60	75	95
Proportion of water entering ram that is elevated	2-7	1-5	1-7	2-17	1-10	1-12	1-14	2-31	1-17	1-18	1-20
Per cent. of useful effect of power expended	80	78	75	72	68	62	57	53	48	43	38



SELF OPERATING PUMP.

We have a similar pattern that will pump water from a spring when driven by water in the creek or such. The driving water must have a fall sufficient to pump it. This is used when there is plenty of bad water and but little good water.

Fig. 1013.

Fig. 1013 is an AUTOMATIC HYDRAULIC RAM, its use is to force a portion of the water which is used to propel it, to any desired elevation as given in the table.

Its principle of operation is as follows: The water flows through the drive pipe and discharge valve until it attains sufficient velocity to raise the valve, which instantly stops the flow of water, producing a blow which forces the water through the inner valve opening into the air-chamber, suddenly compressing the air in the air-chamber, and filling it until the pressure in the air-chamber is equal to the force of the blow produced by the sudden stopping of the water. The air in the air-chamber then forces the water that is in the air-chamber through the discharge pipe. The over-flow valve then drops and the water starts to flow, then the operation is repeated.

INSTRUCTIONS: When erecting avoid any sharp turn in the drive pipe. Adjust the weights on the over-flow valve stem until it will

Sprocket Wheels and Chain.

IG 312

NO. 52 WHEELS.

Diameter at Chain Center.	Teeth	Price.
4	8	$1.00
5⅛	11	1.25
6¾	14	1.60
8½	17	2.00
10	21	2.50
11½	24	2.80
16	33	4.00
16½	34	4.25
20	42	5.00

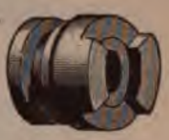


Fig. 1486*

O. 67 WHEELS.

	Teeth.	Price.
	7	$1.40
	8	1.60
	10	2.30
	12	2.50
	13	2.70
	16	3.00
	19	4.00
	22	5.00
	25	5.30
	33	7.00
	41	9.00
	49	11.50
	56	15.00

NO. 75 WHEELS.

Diameter. at Chain Center.	Teeth.	Price.
5	6	$1.50
6	7	1.80
7	8	2.10
8	9	2.40
9½	11	2.70
10	12	3.00
12¼	15	3.50
15¼	18	5.00
16¼	20	5.40
18½	22	5.90
22½	27	6.25
25	29	8.40
29½	35	10.00
38	45	14.50
49	58	22.00

NO. 103 WHEELS.

Diameter. at Chain Center.	Teeth.	Price.
7	7	$2.50
8	8	3.00
9	9	3.20
10	10	3.50
12	12	4.00
14	14	4.70
16	16	5.25
18	18	6.00
20	20	7.25
23	23	9.50
30	30	11.50
36	36	15.00
48	48	24.00
60	61	40.00

Wheels here listed cast with two jawed clutch to take Fig. 1486 clutch coupling, will be furnished 15¢ net extra.

*Fig. 1486 Grooved Clutch and Clutch Lever see Fig. 1486 on another page.

IG 313

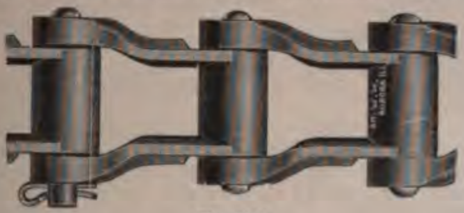


Fig. 810.

PRICES, FIGS. 313 AND 810 MALLEABLE SPROCKET CHAIN.

Chain Number.	Working Strain, Lbs.	Equivalent i Single Lea. Belt.	Links, per Foot.	Number Wheel works on.	Price, per Foot.
52	500	6	8	52	$ .15
57	600	6	5.2	67	.15
67	700	7	5.2	67	.20
75	750	8	4.6	75	.23
77	800	8	5.2	67	.23
78	1000	9	4.6	75	.26
88	1200	10	4.6	75	.31
103	1800	14	3.84	103	.50

Belting, Hose, Couplings, Packing.

PRICE LEATHER AND RUBBER BELT, PER FOOT.

Width Belt, Inches.	Leather Single.*	RUBBER.		
		4-Ply.	5-Ply.	6-Ply.
1	$ .12	$ .15	$......	......
1¼	.16	.17	......	......
1½	.20	.19	......	......
2	.28	.21	......	......
2½	.36	.26	......	......
3	.44	.31	......	......
3½	.52	.37	......	......
4	.60	.42	......	......
4½	.68	.47	......	......
5	.76	.52	......	......
6	.92	.62	.78	.93
7	1.08	.73	.92	1.10
8	1.24	.84	1.05	1.26
9	1.40	.95	1.19	1.43
10	1.56	1.07	1.34	1.61
11	1.72	1.18	1.48	1.77
12	1.88	1.30	1.63	1.95
13	2.04	1.42	1.78	2.13
14	2.20	1.54	1.93	2.31
15	2.36	1.66	2.08	2.49
16	2.52	1.78	2.23	2.67

*Heavy **double** leather belts **twice price** of **single.**

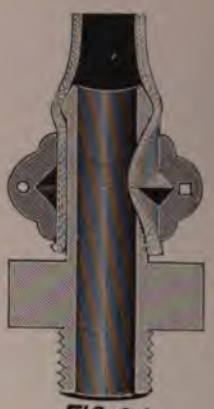


FIG 64

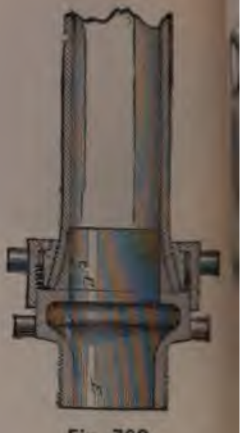


Fig. 760.

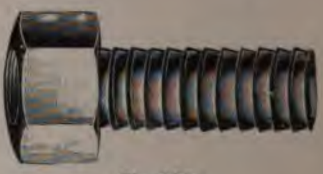


Fig. 132.

PRICE PER FOOT RUBBER, DISCHARGE ‡ AND SUCTION HOSE.

Inside diameter......Inches	¾	1	1¼	1½	2	2½	3	3½	4
3-Ply Discharge Hose......	$ .30	$ .40	$ .50	$ .60	$ .80	$1.00	$1.20	$1.40	$1.90
4-Ply§ " "	.37	.50	.62	.75	1.00	1.25	1.50	1.75	4.00
Suction Hose†, spiral wire......	......	.90	1.15	1.50	2.30	3.10	4.00		
Fig. 64, Hose Coupling. (includes clamp.)......	......	......	......	......	3.10	5.00	8.00		
Fig. 132 Hose Coupling for Jetting. (Pipe thread.)......	.35	.50	1.00	1.50	......	......	......		
Fig. 760 Hose Coupling. (Pipe thread.)......	......	......	......	......	5.60	9.40	15.00		
Hose Coupling, common......	.20	.38	......	......	......	......	......		
Fig 64 Bolted Hose **Clamps only**...... Per pair	......	......	......	......	1.25	1.75	2.75		
Fig. 133 Hose Clamps, extra heavy......	.15	.20	.30	.50	......	......	......		

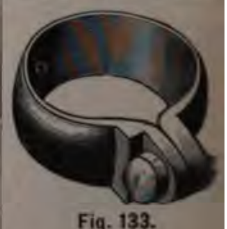


Fig. 133.

§ 5 and 6-ply discharge hose at **25** and **50 per cent.** advance on 4-ply price respectively.
‡ Marlin or wire winding **25 per cent.** net extra.
† 1½ inch and smaller suction hose on spiral wire; larger is smooth bore.

Fig. 864.

Fig. 864, Hard or Soft Rubber Valves......	per lb.	**$2.00**
Packing. Soapstone, ⅜, ½ or ⅝ inch......	" "	.60
" Hemp......	" "	.60
" Round or Square Piston......	" "	1.60

Well Sinkers Heavy Iron Pulleys.

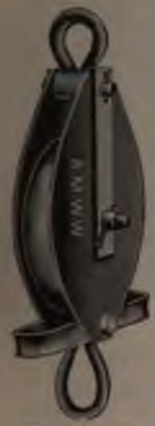


Fig. 1619.

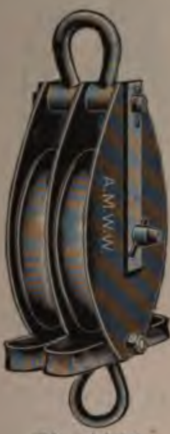


Fig. 1620.

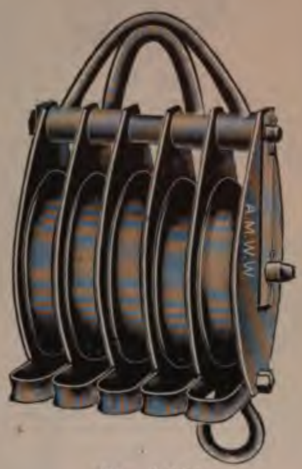


Fig. 1621.

Figs. 1619, 1620 and **1621** illustrate our heavy **Iron Derrick Pulleys.** These illustrations show the construction and the lists give the sizes in which they are made. An important feature is that the axle is removable for cleaning and oiling.

PRICES IRON DERRICK PULLEYS, FIGS. 1619, 1620 and 1621.

No.	Diam. Sheave, In.	Size Rope for	1-Sheave.	2-Sheave	3-Sheave	4-Sheave	5-Sheave
1	10	1¼	$ 7.00	$13.00	$19.00	$25.00	$30.00
2	12½	1½	8.00	15.00	22.00	28.00	34.00
3	12½	1¾	9.00	17.00	25.00	32.00	39.00
4	12½	2	10.00	19.00	28.00	36.00	44.00
5	14	2¼	15.00	28.00	42.00	54.00	65.00
6	16	2½	21.00	38.00	55.00	72.00	90.00
Prices Fig. 1150.							
1	10	1¼	11.00	16.50	22.00		
2	12½	1½	14.00	21.00	28.00		
3	12½	1¾	22.00	33.00	43.00		
4	12½	2	27.00	39.00	51.00		
5	14	2¼	34.00	49.00	64.00		

Prices FIG. 1151, 1152, 1153. (Hooks not Swiveled, without Becket.)
Add 50 cents per Sheave for Becket.

No.	Diam. Sheave, In.	Size Rope for	1-Sheave.	2-Sheave	3-Sheave
1	4	¾	2.00	3.50	4.25
2	6	1	2.25	4.00	5.00
3	8	1¼	3.00	5.50	7.50
4	10	1¼	3.50	6.50	9.25

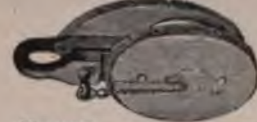


Fig. 1150.

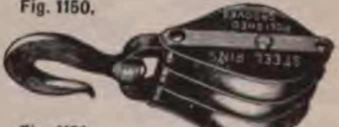


Fig. 1151.

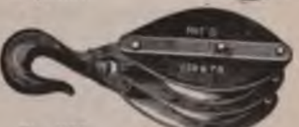


Fig. 1152.

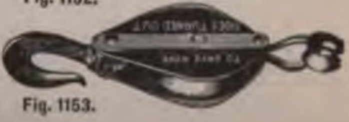


Fig. 1153.

WELL SINKERS' PULLEY BLOCKS.

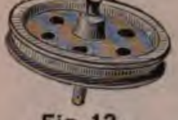


Fig. 12.
STYLE OF SHEAVE.

Fig. 256 is our Well Derrick Pulley. It is extra strong, has removable axle, long hub, straight straps and is turned and bored in lathe. Large heavy ones have straps between each sheave with a bolt at top and bottom through straps and are provided with clevis.

Fig. 407 is same as Fig. 256 with addition of rope guides and becket. Fig. 407 should be used for lower block.

For a four, six or eight sheave block, we recommend twinning the blocks together, using an axle extending through both blocks and bolts passing through straps both top and bottom. Washers may be used at top to hold sheaves out of line and make ropes run straight.

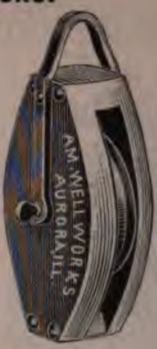


Fig. 256.

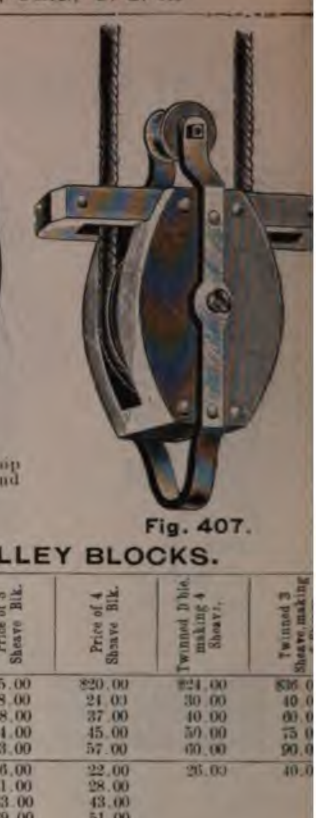


Fig. 407.

PRICES FIGS. 256 AND 407 PULLEY BLOCKS.

	Size Rope made for.	Diam. of Sheave.	Price Sheave Wheel only.	Price, Single Sheave Blk.	Price of 2 Sheave Blk.	Price of 3 Sheave Blk.	Price of 4 Sheave Blk.	Twinned D'ble, making 4 Sheave.	Twinned 3 Sheave, making
Fig. 256.	1 to 1¼	10	$1.70	$5.00	$10.00	$15.00	$20.00	$24.00	$36.0
	1½ " 1¾	12½	3.00	6.00	12.00	18.00	24.00	30.00	40.0
	2	12½	3.20	11.00	19.00	28.00	37.00	40.00	60.0
	2¼	14	5.00	12.00	23.00	34.00	45.00	50.00	75.0
	2½	16	7.00	15.00	29.00	43.00	57.00	60.00	90.0
Fig. 407.	1 to 1¼	10		6.00	11.00	16.00	22.00	26.00	40.0
	1½ " 1¾	12½		7.00	14.00	21.00	28.00		
	2	12½		13.00	22.00	33.00	43.00		
	2¼	14		15.00	27.00	39.00	51.00		
	2½	16		19.00	31.00	49.00	61.00		

PRICE OF CROWN PULLEYS with turned axles, used on top of Derrick. 1¼-in. Rope $2.75; 1½-in. $4.00; 1¾-in. $5,50; 2-in. $7.00; 2¼-in. $9.00; 2½-in. $10

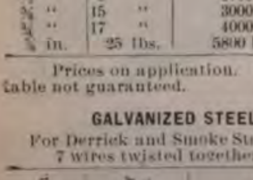


Fig. 261.

PURE MANILLA WELL ROPE.

Hawser Laid Manilla Rope, for Oil and Artesian Wel

We sell pure Manilla Rope only—No mixed or sisal. Hawser laid weights Approximate 10% more.

Size in Diam.	Weight of 100 ft.	Strength of New Rope.	Size in Diam.	Weight of 100 ft.	Strength of New Rope.	Size in Diam.	Weight of 100 ft.	Strength of New Rope.
⅜ in.	5½ lbs.	900 lbs.	1 "	33 "	7000 "	1¾ in.	100 lbs.	23500 lbs.
7-16 "	7 "	1230 "	1⅛ "	42 "	900 "	2 "	120 "	29300 "
½ "	8 "	1700 "	1¼ "	46 "	11000 "	2¼ "	140 "	37000 "
⅝ "	15 "	3000 "	1⅜ "	54 "	13500 "	2½ "	192 "	4000 "
¾ "	17 "	4000 "	1½ "	67 "	17000 "	2¾ "	217 "	54000 "
⅞ in.	25 lbs.	5800 lbs.	1⅝ "	84 "	19905 "	3 "	276 "	67000 "

Prices on application. We keep only the very best, as that is the cheapest. Estimated weights of rope table not guaranteed.

GALVANIZED STEEL WIRE STRAND.

For Derrick and Smoke Stack Guys. Composed of 7 wires twisted together into a single strand.

Diam. in.	W't. per 100 Ft.	Est. Breaking Strength.	Price per 100 Ft.
½	50 lbs.	8320 lbs.	$2.25
7-16	37 "	6000 "	1.65
⅜	30 "	4700 "	1.40
5-16	21 "	3300 "	1.05
¼	11½ "	1750 "	.60

CAST STEEL DRILLING CABLE.

With 19 Wires to the Strand. Has hemp center.

Diam. inches.	Weight per	Proper working load, tons.	Min. size Drum or Sheave, in.	Price per 100 Ft.
⅞	1.2 Lbs.	5	42	$15.00
¾	.88 "	3½	36	11.50
⅝	.60 "	2½	27	9.00

LEFT HAND TWIST STEEL CABLE FOR HOISTING POLE TOOLS. This cable being special, is not listed *any manufacturer. We furnish it at lowest market price at time order is placed.*

Drill Rod Elevators, Hoisting Hooks.

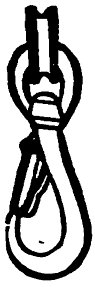


Fig. 538.

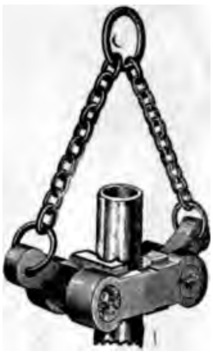


Fig. 1084.

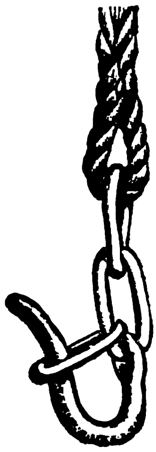


Fig. 537.

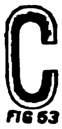


FIG 53

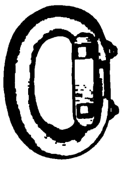


Fig. 518.

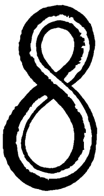


Fig. 1034.

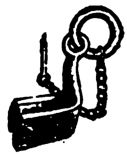


Fig. 362.

Fig. 53, C Hook, for conveniently rigging pulleys, and like uses.
" **518,** Strapped C Hook, for like purposes as Fig. 53, but heavier and safer.
" **537,** Safety Hook. The load prevents unhooking.
" **538,** Snap Hook. It cannot accidently unhook.
" **1034,** Rod Lifter, handles 1 and 1¼ inch pipe in one end, and 2 inch pipe in the other. When one length is raised, it slides down on next length.

Fig. 362, Pipe Elevator, is used for hoisting drill rods by catching under couplings. When a length is raised, the elevator slides down for removing.

Fig. 1084, Diamond Drill Rod Elevator, grips flush rods at any point.

PRICES OF DRILL ROD HANDLING TOOLS.

Diam. Iron made from, inches	¾	⅞	1	1⅛	1¼	1½	1¾	2	2½
Fig. 53. C. Hook	$....	$....	$....	$1.25	$1.70	$	$	$	$
" **518,** Strapped C. Hook	......	......	......	......		3.70	5.00	$6.70	10.00
" **537,** Safety Hook	......	2.50	3.30	......	4.50	6.50			
" **538,** Snap Hook	......	......	5.50		6.70	8.00	11.50		
" **1034,** Rod Lifter	......	......			3.25	3.75			

Size drill rods Figs. 362 and 1084 will grip, inches	1	1¼	1½	2
Fig. 362, Elevator	3.75	5.00	6.70	9.25
" **1084,** Diamond Rod Elevator	6.70	8.00	10.00	13.50

Patent Revolving and Jetting Swivels.

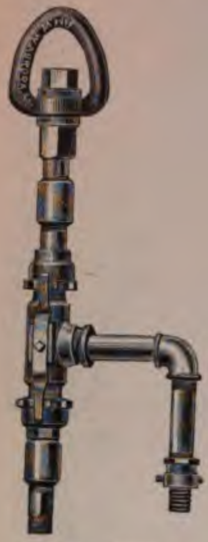


Fig. 331*

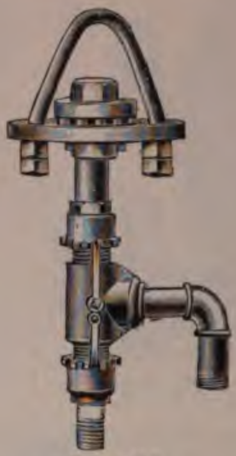


Fig. 925*

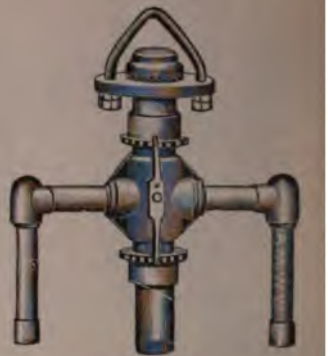


Fig. 1633*

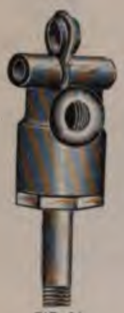


FIG 41

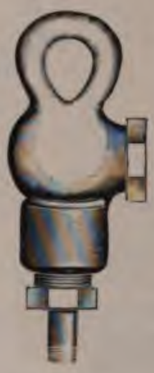


Fig. 744.

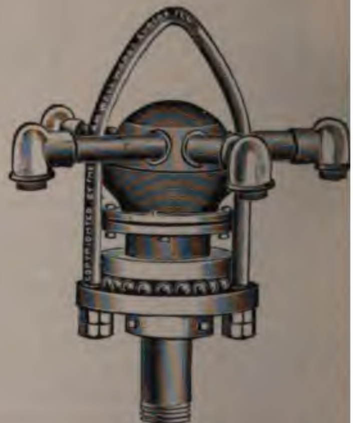


FIG 38

Fig. 331 is used for conducting water to drill rods when jetting. See Fig. 14 for process.

Figs. 925, 1633 and **38**, Ball Bearing Swivels, are used for conducting water to pipe being su by revolving process. See Figs. 352 and 354 for process.

Figs. 744 and **41** are used with Figs. 399 and 1646 machines only.

PRICES, CHAPMAN'S PATENT JETTING AND ROTARY SWIVELS.

Size pipe screws to	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Fig. 331* Jetting Swivel	$14.00	$17 50	$29 00	$37.00	$46.00	$69 00	$	$	$	$	$
" **925*** Rotary "			47.00	57.00	75 00	92 00	100.	110.			
" **1633*** " "				67 00	88 00	112.00	122.	134.			
" **38,** " "									156.	170.	18
" **744,** " "	6 00	7.50	10 00	12 50							
" **41,** with guide rod not shown	7 50	9.25	12.00	14 50							

**Inlet pipes to and including elbow only.*

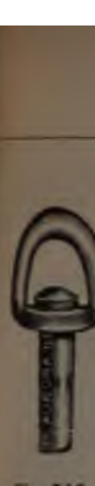


Fig. 542.

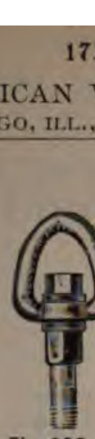


Fig. 926.

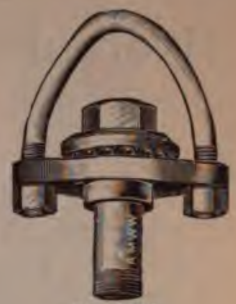


Fig. 1634.

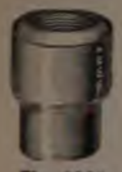


Fig. 1635.

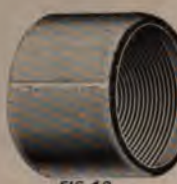


FIG 40

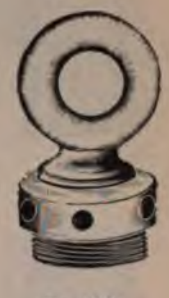


Fig. 1231.

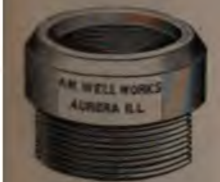


FIG 50

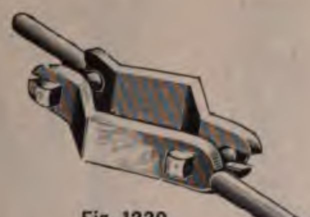


Fig. 1230.

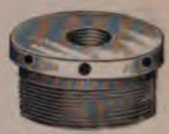


Fig. 68.

Fig. 40, XXX Heavy Forged Drilling and Rotary Couplings, made without weld by punching from solid piece of steel. They are used to connect drills to rods.

Fig. 50, Forged Rotary and Drilling Bushings, made without weld by punching from solid piece of steel. Used to connect drills or swivels to drill rods.

Fig. 68, Cast Pipe or Casing Head to connect rotary swivels to well pipe when using rotary process.

Fig. 542, Regular Rope Swivel for handling drill rods.

Fig. 926, Heavy Rope Swivel for handling heavy lines of drill rods.

Fig. 1634, Ball Bearing Rope Swivel for handling heavy lines of rods and permitting screwing them together without tendency to twist rope.

Fig. 1230, Rotary Pipe Clamps for holding well pipe with rotary process.

Fig. 1231, Pipe Swivel for handling pipe or casing in well. For large pipe add Fig. 68 of required sizes.

Fig. 1635, Forged Drilling Reducer, made without weld by punching from one piece of steel. It is used to connect different sizes of drill rods, also drills to rods.

PRICES SWIVELS, DRILLING COUPLINGS, BUSHINGS, REDUCERS, CLAMPS

Size pipe screws to...	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	15
Fig. 542, Swivel....	$ 3.00	$ 4.50	$.....	$.....	$.....	$.....	$.....	$.....	$...	$...	$...	$...	$...	$...	$...	$...	$...
" 926, "	4.50	6.00	7.50	9.00	12.00	15.00	......	......	....	....	....	...	..	....	....	..	....
" 1231† "	......	......	......	4.50	5.50	6.50	7.50	9.00	11.	15.	....	....	....	....	..	..	....
" 1634, "	10.00	13.00	16.00	20.00	25.00	30.00	37.00	45.00	54.	67.	75.	....	....	....	....	....	....
" 40, Coupling..	.70	.80	1.25	1.80	2.75	3.75	5.00	7.00	9.	12.	15.	18.	21	25.	....	....	....
" 50* Bushing..	......	1.00	1.40	1.75	2.30	3.25	4.80	6.00	8.	10.	13.	17.	22.	28.	....	....	....
" 68*† "	......	......	......	......	......	2.50	3.00	3.50	4.	5.	7.	10.	14.	17.	19.	25.	40.
" 1635* Reducer..	......	1.20	1.60	2.00	3.00	4.00	5.75	7.50	10.	12.	16.	....	....	....	....	....	....
" 1230, Clamps...	......	......	......	3.00	3.50	4.00	4.50	5.00	6.	7.	8.	9.	10.	12.	14	25.	35.

*Listed under largest end. Figs. 50 and 1635 reducing more than three sizes, **charged 10 per cent. net extra** for each three sizes additional reduction or part thereof.

†Oil *well casing sizes made* at price of next larger standard pipe size.

Hydraulic, Jetting and Revolving Drills

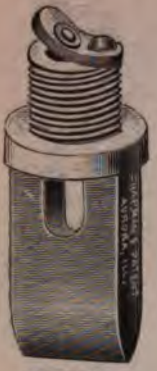


Fig. 238.

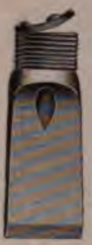


FIG 237

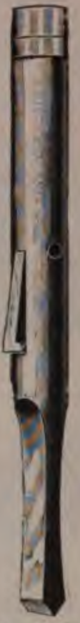


Fig. 1203.

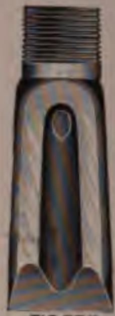


FIG 773

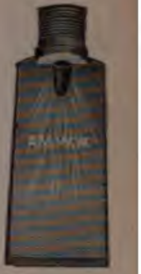


Fig. 1625.

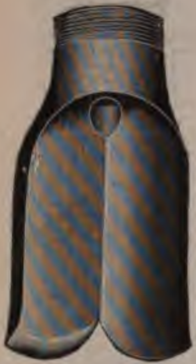


Fig. 1024.

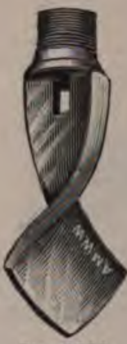


Fig. 1626.

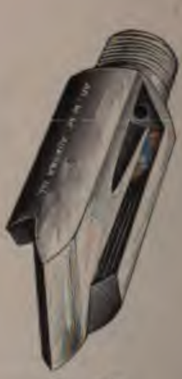


Fig. 745.

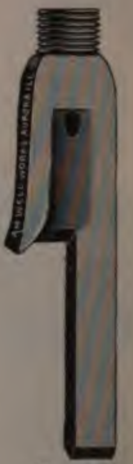


FIG 336

PRICES†* HYDRAULIC, JETTING AND REVOLVING DRILLS.

Size pipe drills listed pass through†	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Size pipe screws to*	1	1	1¼	1¼	2	2	2½	2½	3	3	3	4	4
Fig. 237 Hydraulic Drill " **238** " " " **1626** Hyd. and Jett'g Drill	$ 2.40	$ 3.30	$ 5.00	$ 6.00	$ 7.70	$.....	$.....	$..	$...	$...	$...	$...	$...
" **336** Shoulder Drill	6.25	8.20	10.70	13.30	17.00	22.00	29.00	35.	45.	57.	70.	85.	105.
" **745** Hyd. and Jett'g Rock Drill	4.20	5.20	6.30	9.20	10.00	13.50	16.00	20.	27.	35.	42.	50.	59.
" **773** " " " " "	3.30	4.30	5.40	6.40	8.30	10.00	12.00	15.	20.	27.	32.	39.	47.
" **1203** Hyd. & Jett'g Under Reamer	......	......	......	40.00	47.00	62.00	74.00	88.	105.	122.	142.	167.	200.
" **1625** Jetting Drill	2.70	3.50	4.30	5.20	6.70	8.00	9.60	12.	16.	22.	26.	32.	38.
Pipe Fig. 1024 screws to*	1	1¼	2	2	2½	2½	3	3	4	4	4	5	5
Fig. 1024 Rotary Drill	4.20	5.20	6.30	9.20	10.00	13.50	16.00	20.	27.	35	42.	50.	59.

*Drills ordered with shanks larger or smaller than listed, are special, and will be charged 10 per cent. higher than regular drills.

†*Intermediate sizes* at price of next larger but shanks of next smaller size.

Chapman's Patent Paddy Drills.

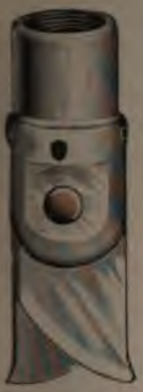


Fig. 216.

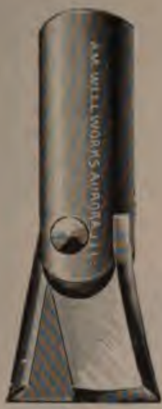

A.M. WELL WORKS AURORA ILL

Fig. 1036.

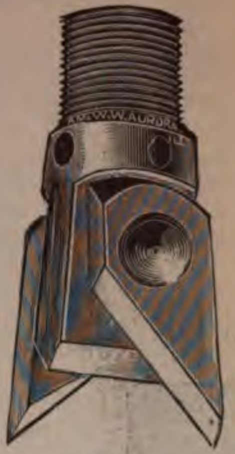


Fig. 27.

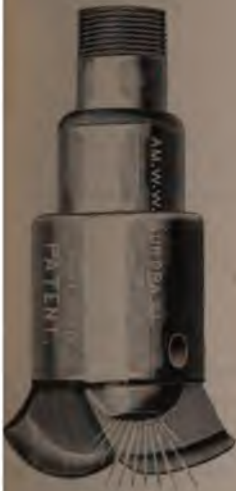


Fig. 923.

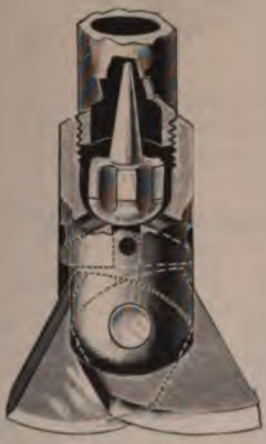


Fig. 1044

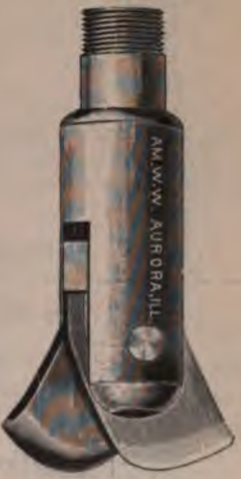

AM.W.W. AURORA,ILL.

Fig. 602.

Figs. 27, 216, 602 are Drop Paddies for Jetting; **Fig. 1044** is Drop Paddy for Hydraulic. and **Fig. 923**, Rotary Paddy for Revolving process. See Figs. 14 and 705 for operation of drills. All make the hole large enough for pipe to follow.

Fig. 1036, Spring Paddy Reamer, trues up and enlarges a hole already sunk too small for pipe to follow, and is used with Jetting process.

PRICES* CHAPMAN'S PATENT PADDY DRILLS.

Pipe will go through and cut hole for Pipe screw to,	2 1	2½ 1	3 1¼	3½ 1¼	4 2	4½ 2	5 2½	6 2½	7 3	8 3	9 3	10 4	12 4
Fig. 27, or 216, Drop Paddy....	$ 5.00	$ 6.70	$ 8.20	$11.70	$16.	$20.	$25.	$30.	$35.	$43.	$55.	$70.	$100.
" **602,** " "	6.70	9.00	11.00	15.50	21.	27.	33.	40.	47.	58.	73.	93.	133.
" **923,** Rotary Paddy....	7.00	9.50	11.50	16.00	22.	28.	35.	42.	49.	61.	77.	98.	140.
" **1036,** Spring Paddy Reamer	9.40	12.60	15.50	22.00	20.	38.	47.	56.	66.	81.	103.	132.	188.
Extra Rivets, all styles, each	$ .20	.25	.35	.40	.50	.60	.70	.80	.90	1.00	1.25	1.50	1.90

***Extra Wings** only for Fig. 1036, **40%**, and all other styles **25%** of price of complete drill. Drills ordered with shanks other than as listed are special and will be **10% higher.** Drills to work in oil well casing at price of next larger standard drill.

Rotary and Drive Shoes.

Fig. 120 shows our low priced Tubular Well Drive Shoe. It is made of cast cast steel or of malleable iron. the cast cast steel being flush inside (open pattern), the malleable iron made either open pattern or with screen shoulder (closed pattern). Open pattern is always sent unless otherwise specified.

Fig. 357 illustrates our Rotary Shoe which is used on bottom end of line of pipe to be sunk by Rotary process (see Figs. 352 and 353). It is made seamless, punched from a solid piece. It is made both of tool steel and machine steel case hardened, and of standard and extra lengths of both metals, the extra length shoe having more sleeve than the standard length.

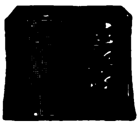


Fig. 120.

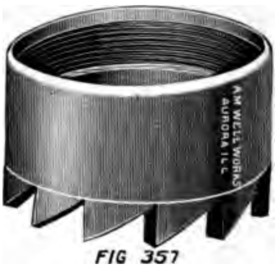


FIG 357

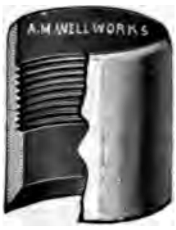


Fig. 393.

Fig. 393 illustrates our standard Deep Well Drive Shoe. It is made seamless, punched from one piece of metal, of tool steel or machine steel case hardened, as preferred, and of standard and extra lengths of both metals, the extra length shoe having more sleeve than the standard length.

PRICES OF ROTARY AND DRIVE SHOES.

Size Pipe Screws to	Fig. 357.				Fig. 393.				Fig. 120.		
	Tool Steel.		Machine Steel Case Hardened.		Tool Steel.		Machine Steel Case Hardened.		Cast Cast Steel	Malleable Iron	
	St'd Length.	Extra Length.	St'd Length.	Extra Length.	St'd Length.	Extra Length.	St'd Length.	Extra Length.		Open.	Closed
2	$ 8.00	$ 10.70	$ 5.00	$ 6.70	$ 5.00	$ 6.70	$ 2.00	$ 5.00	$ .90	$ .50	$ .8
2½	8.80	11.80	5.40	7.60	5.40	7.60	4.40	5.40	1.50	.60	1.1
3	9.60	13.00	6.60	8.80	6.60	8.80	5.30	6.60	2.00	.80	1.4
3½	10.70	14.30	8.20	11.00	8.20	11.00	6.60	8.20	3.50	1.00	
4	12.00	16.00	9.50	12.50	9.50	12.50	7.50	9.50	4.00	1.20	
4½	13.50	18.50	11.00	14.50	11.00	14.50	9.00	11.00	5.50		
5	15.50	20.50	12.00	16.00	12.00	16.00	10.00	12.00	6.00		
6	17.50	23.00	13.50	18.00	13.50	18.00	11.00	13.50	8.00		
7	20.00	27.00	15.00	20.00	15.00	20.00	12.00	15.00			
8	22.50	30.00	17.00	23.00	17.00	23.00	13.50	17.00			
9	29.00	39.00	22.00	29.00	22.00	29.00	17.00	22.00			
10	36.00	50.00	27.00	36.00	27.00	36.00	22.00	27.00			
12	64.00	84.00	48.00	64.00	48.00	64.00	38.00	48.00			
15	96.00	130.00	72.00	96.00	72.00	96.00	58.00	72.00			

Hand Boring Augers.

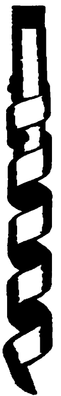


FIG 26

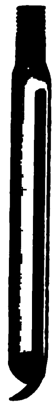


FIG 56

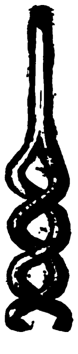


Fig. 93.

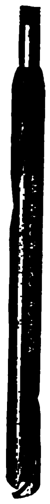


Fig. 119

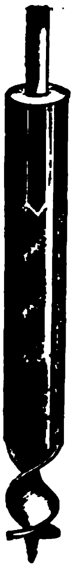


Fig. 63.

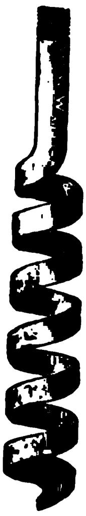


Fig. 232.

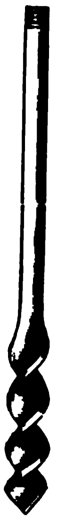


Fig. 547.

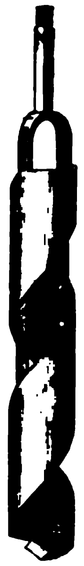


Fig. 1022.

Figs. 26, 56, 119, 232, 547 and 1022 excel in earth and clay; Fig. 63 in caving materials and; Fig. 93 in cobblestones; Fig. 547, soapstone and like formations.

All are used for hand boring by using standard pipe rods for desired depth; Fig. 559 clamp l for turning, and Fig. 542 rope swivel for hoisting.

PRICES FOR EARTH AUGERS.

Size pipe will enter .... inches	2	2½	3	3½	4	4½	5	6
Size pipe screws to*	1	1	1¼	1¼	2	2	2½	2½
Figs. 26, 56, 93 or 119	$3.25	$3.75	$4.60	$6.00	$7.00	$	$	$
" 232	3.50	4.00	5.00	6.60	7.75			
" 547	6.25	7.50	9.00	12.00	13 50			
" 63 or 1022					15.00	18.50	24.00	30.

*When other sized shanks than listed are wanted, add price of reducers to make desired size.

Hydraulic, Jetting Tools.

Figs. 5 and **774** are Solid Drive Heads for use on drill rods. The Fig. 774 permits bar for turning auger to be used.

Fig. 561 Drive Plate used on well pipe to protect drive block.

Fig. 593 is Hydraulic Blind Valve used in line of drill rods. See process, Fig. 116.

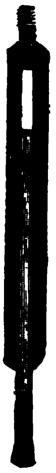


Fig. 541.

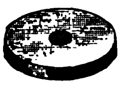


Fig. 561.

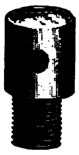


Fig. 5.

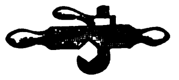


Fig. 559.

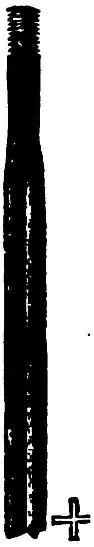


Fig. 251.

Star Drill

Price for 2
with 1 In. sh
——$7

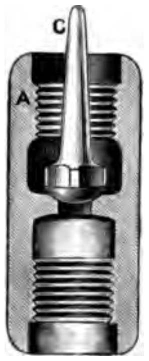


Fig. 593 A.

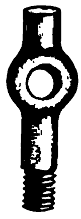


Fig. 774.

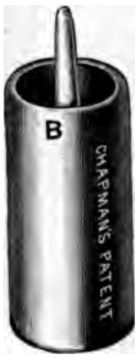


Fig. 593.

Fig. 255.

Pipe screws to, inches	1	1¼	1½	2	2½	
Price Fig. 5, Drive Head	$2.00	$2.50	$3.25	$5.00	$....	$..
" " 774, " "	1.25	1.50	....	....		
" " 593, Blind Valve	.80	1.30	2.00	2.60		
" " 559, Rod Turner	1.00	1.60	....	....		
Pipe Fig. 561 will drive† ... Inches	2 to 3	3 to 4½	....	3 to 6	4 to 7	4½
Fig. 561, Drive Plate	2.50	3.40	....	5.80	7.50	10

†Fig. 561 listed under size of drill rod center hole will pass.

PRICES ROCK TOOLS FOR JETTING AND HYDRAULIC OUTFITS.

	Hole Figs. 74 and 255 for ... Inches.	2	2½	3
Size Joints, Fig. 74 and lower end Fig. 255*	Pin Diameter ... "	1	1	1⅛
	Pin Length ... "	1½	1½	2⅛
	Box Diameter ... "	1 9-16	1 9-16	2½
	Threads per inch	8	8	6
Bar Diameter, Fig. 255 ... Inches		1½	1⅝	2
Bar Length " " ... Feet		14	14	14
Price, Fig. 74 Z Drill		$10.00	$11.00	$13.50
" " 255 Bar		12.50	13.50	15.00
" " 541 Jars		7.50	9.00	10.50
" " 77 Drill Wrench		6.60	6.60	9.00

***Fig. 541 and top of Fig. 255 for 2 and 2½ inch holes are threaded *1 inch* and *for* 3 inch holes, 1¼ inch pipe thread.**

Fig. 74.

Fig.

Pipe Driving Tools.

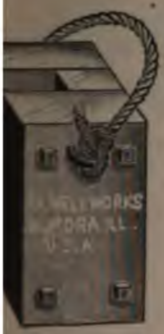

WELLWORKS
URORA ILL.
U.S.A.

Fig. 771.

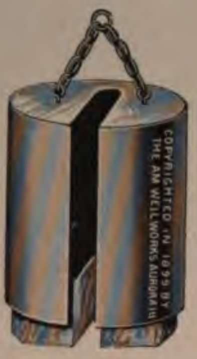

COPYRIGHTED IN 1895 BY
THE AM WELL WORKS AURORA ILL

Fig. 47.

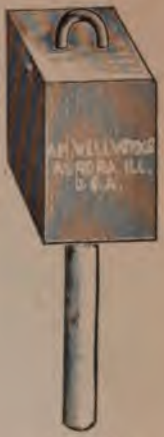

AM WELL WORKS
AURORA ILL.
U.S.A.

Fig. 772.

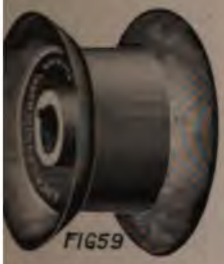


Fig. 771,	Hollow Drive Block, drives while drilling with Jetting machines; weight Apx. 275 lbs	$14.00
" 772,	Solid Drive Block, " " 275 "	11.50
" 47,	Hollow Cast Iron Wood Faced, weight Apx. 425 lbs.	28.00
" 47,	Same as last " " 600 "	40.00
" 47,	" in halves, hinged both sides " " 800 "	58.00
" 47,	" as last, but " " 1550 "	100.00
" 59,	Cathead, for pipe driving and handling, bored, key seated and turned	7.50
" 59,	Same, but extra long	10.00

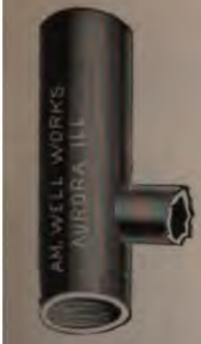


Fig. 753.

PRICES FIG. 753 JETTING DRIVE TEE.

e screws to inches let tap of Fig. 753 "	2 1	2½ 1	3 1¼	3½ 1¼	4 2	4½ 2	5 2½	6 2½	7 3	8 3	9 3	10 4
. 753, (no side pipe)	$5.00	$7.50	$8 75	$10.00	$12 00	$14.	$17.	$20	$25.	$31,	$38.	$47.

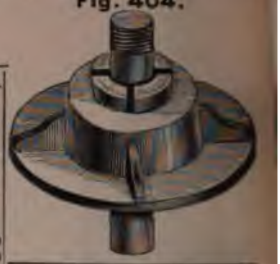
CHAPMAN'S WELL PIPE PULLERS.

FIG. 11 illustrates Chapman's Outside Pipe Puller for pulling pipe. Figs. 200 and 330 show how it is used. The wedges are serrated to hold pipe firmly and not crush it. It permits pipe couplings to pass through.

PIPE PULLER COMPANION, is as a puller used to hold pipe while lowering for another pull, see Fig. 330.

Fig. 404 illustrates Casing Holder for holding pipe when lowering pumps in open wells, and also used for the pump's base on platform for holding weight of pipe when it hangs in open wells.

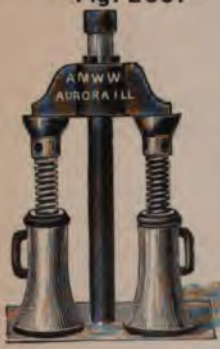
Fig. 404.



PRICES FIG. 11 PIPE PULLER, AND FIG 404 CASING HOLDER. ADD PRICE OF JACK SCREWS IF WANTED.

Size Pipe or Casing will pull	1	1¼	1½	2	2½	3	3½	4	4¼	4½	5	5⅝	6	7	8	9	10	12
FIG. 11.																		
No. 2, with 2-in. wedges	$	$	$	$2.20	$	$	$	$	$	$	$	$	$					
Extra wedges for No. 2	.40	.40	.36	.36														
No. 3, with 3-in. wedges	....	....	....	....	....	3.50	....	....	....	....	....	....	....					
Extra wedges for No. 3	.75	.70	.65	.60	.55	.50												
No. 5, with 5-in. wedges	....	....	....	....	....	....	....	....	....	....	6.00	....	....					
Extra wedges for No. 5						1.80	1.60	1.50	1.40	1.25	1.00							
Bushings No. 5 to	....	....	....	....	....	1.20	....	....	....	....	....	....	....					
No. 6, with 6-in. wedges													8.00					
Extra wedges for No. 6	....	....	....	....	....	....	2.40	2.20	2.20	2.00	1.75	1.50	1.30					
Bushings No. 6 to						1.70												
No. 8, with 8-in. wedges	....	....	....	....	....	....	....	....	....	....	....	....	....	$....	$10.00	$....	$....	$....
Extra wedges for No. 8												2.20	2.00	1.75	1.50			
Bushings No. 8 to	....	....	....	....	....	....	....	....	....	3.70	....	....	1.80	....	....	....	....	....
No. 9, with 9-in. wedges																14.00		
Extra wedges for No. 9	....	....	....	....	....	....	....	....	....	....	....	....	6.00	4.50	3.50	2.75	....	....
Bushings for No. 9 to													4.00		2.75			
No. 10, with 10-in. wedges																	16.00	....
Extra wedges for No. 10													7.00		4.50	3.50	3.00	
Bushings No. 10 to	....	....	....	....	....	....	....	....	....	....	....	....	5.00	....	....	....	....	....
No. 12, with 12-in. wedges. (Made in halves.)																		30.00
Extra wedges for No. 12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	12.00	10.00	8.50	6.00
FIG. 404, Casing Holder, with 3-in. wedges						3.50												
E'tra wedges for **Fig. 404**	.75	.70	.65	.60	.55	.50	....	....	....	....	....	....	....	....	....	....	....	....

Fig. 200.



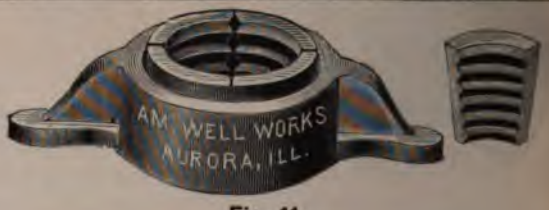


Fig. 11.

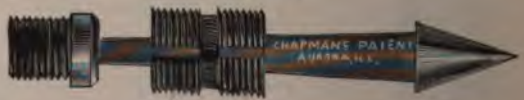
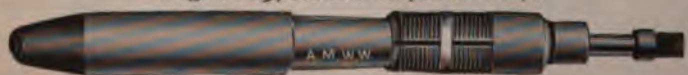


Fig. 665.

Fig. 1609, Contracted to pass down Pipe.



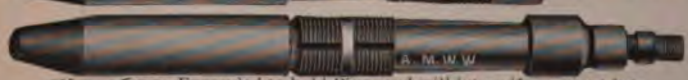


Fig. 1609, Expanded to hold Pipe, and will let go if you want it to.

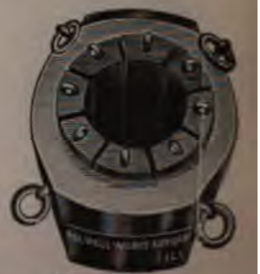


Fig. 677.

Fig. 665 and 1609 illustrate Chapman's Patent Inside or Underground Pipe Pullers, for taking out pipe which is broken off below surface. They are so constructed that they will firmly grip the pipe, **and when desired FIG. 1609 can be released and taken out,** but not Fig. 665. They are made of tool steel.

Fig. 677, Casing Lifter. It is raised with Block and Falls, Jackscrews or Hydraulic Jacks. Prices on application with specifications.

Prices Inside Pipe Pullers, FIGS. 665 and 1609.

Size Pipe will pull	2	2½	3	3½ & 4	4½	5	6	7	8	9	10	12
Size Pipe Connects to	1	1¼	2	2½	3	3½	4½	5	6	7	8	9
Price **Fig. 665**	$7.00	$10.00	$14.00	$18.00	$22.00	$25.00	$35.00	$40.00	$50.00	$60.00	$75.00	$100.
" " **1609**	9.00	12.50	17.50	22.50	27.50	32.00	44.00	50.00	63.00	75.00	94.00	125.

Figs. 665 and 1609 are fitted with dies to pull oil well casing, at price for next larger sized standard pipe.

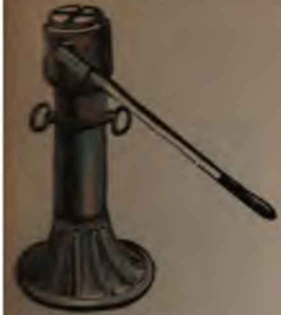


Fig. 350.

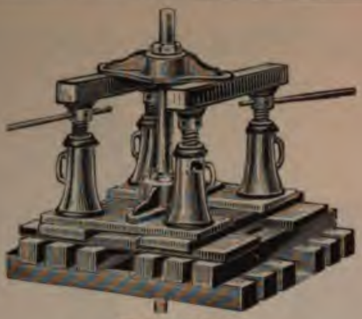


Fig. 330.

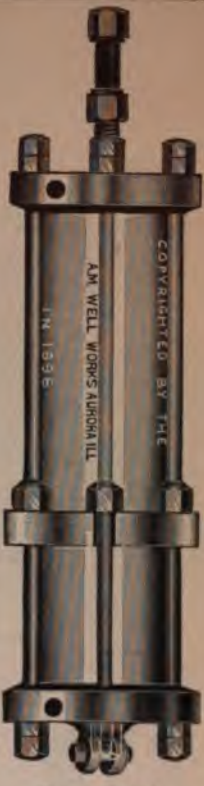


Fig. 1604.

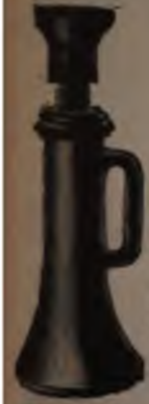


Fig. 35.

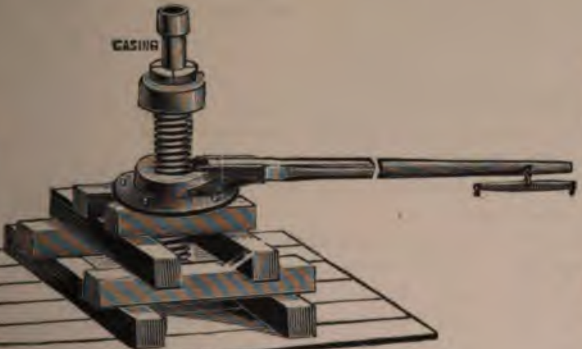


Fig. 344.

Fig. 344. Horse Power Pipe Puller for pulling 3 inch and smaller pipe out of the ground. It has ball bearings, same as used in our Revolving Machinery. It saves manuel labor, and is a perfect tool. It will save its cost on the first hard job of pulling which you have.

List Price, with 2, 2½ and 3 inch Wedges **$20.00**

Price **Fig. 350,** to lift or press 10 tons and run out 18 inches	**$110.00**
" " " " 20 " " " 12 "	**150.00**
" " " " 30 " " " 12 "	**200.00**

Fig. 330 illustrates the best manner of pulling well pipe which has become stuck. Use timbers long enough so they will spring. Tighten jacks just sufficiently to put strain on pipe, then jar the line of pipe, not too hard, but continually with drive block. Run up jacks as the pipe rises, keeping a strain on. This will prevent pulling pipe in two. This Fig. also shows how to use Pipe Puller Companion for holding pipe while puller is lowered for another pull.

Fig. 1604 is a **Hydraulic Pipe Sinking Jack,** for forcing well pipe into the earth at the same time sand and gravel is removed. Two jacks are used, anchored to timbers buried deep enough to resist the force pushing down. The pipes which connect the top and bottom of jacks with Hydraulic Steam Pump have valves for reversing the Jack Plungers. Water forced under the plungers, lift; when switched in top, pulls down. The jacks are used successfully for sinking wells through coarse gravel, sand and boulders with what is known as stove or [illegible] casing. It will also sink standard pipe.

PRICES OF MACHINE, FIG. 1604.

For Full List of Tools for Forcing Pipe Down, Prices on Application.
Instructions for Operation to Purchaser.

PRICES EACH, WROUGHT IRON JACK-SCREWS WITH LEVER,
FIG. 35.

No. of tons will lift at 60 lbs. steam pressure.	Length stroke of Jack in feet.	Diam. of Jack, inches.	Diam. Hyd. Pump used, inches.	Diam. of Steam Cyl., used, inches.	Price for Hydraulic Jack as shown.	Diam. of Screws.	Height Stand.	Height Total.	PRICE.
60	4	6	¾	6	$100.00	2	14	18½	$ 8.25
[illegible]	4	8	¾	6	150.00	2	20	24½	11.50
[illegible]	4	10	¾	6	180.00	2¼	20	25	13.25
[illegible]	4	12	¾	6	235.00	2¼	24	29	15.75
[illegible]	4	14	¾	6	350.00	2½	18	24	11.50
						2½	24	30	18.25

For dimensions and sizes of Hydraulic Pumps, see Pump Department.
Any dimension Jack made to order.

Pipe Pullers and Grabs.

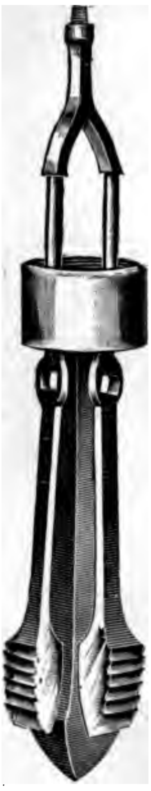


Fig. 1202.

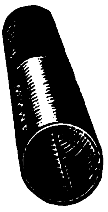


Fig. 1624.

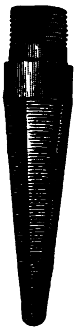


FIG 764

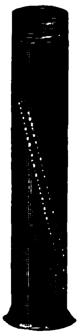


Fig. 97

Fig. 29 Check Valve Grab for pulling Chapman's patent tubular well valves. Figs. 48, 725 and 728.

Fig. 97 Friction Grab, pulls broken drill or wood rod.

Fig. 114 Spring Grab, pulls drill or wood rod on which coupling remains.

Fig. 118 Screen Grab, pulls screen from well.

Fig. 764 or 1624, Screw Grab, pulls broken drill rods or broken well valves. Have water ways.

Fig. 1202 Inside Pipe Puller, made in modified form only to adopt improvements not shown. Each puller, by adding wedges required, will pull four sizes of pipe. It will take hold or let go and is the best inside pipe puller made for heavy duty.

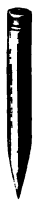


Fig. 118.

PRICES FISHING GRABS.

Pipe screws to .... Inches	¾	1	1¼	1½	2	
" Figs. 97 and 114 enter .... "			2	2½	3	
Price, Fig. 29, Check Valve Grab	$......	$1.50	$2.40	$......	$......	$
" " **114,** Friction Grab			1.25	1.75	2.00	
" " **97,** Spring Grab					3.25	
" " **118,** Screen Grab	.80	1.30				

PRICES FIGS. 764 AND 1624, SCREW GRABS.

Pipe Fig. 764 Pulls ...... Inches	¾ to 1¼	¾ to 1½	....	1 to 2	1¼ to 2½	1¼ to 3	2 to 3½	2
" " **1624** " ...... "	1	1¼	1½	2	2½	3		
Smallest pipe Fig. 1624 enters	2	2½	3	3½	4	5		
Pipe both screw to	1	1	1¼	2	2	2½	3	
Fig. 764, Screw Grab	$5.00	$8.00	$.......	$7.50	$11.	$15.	$20.	$
" **1624,** Hollow Screw Grab ..	8.50	10.00	12.50	15.00	18.	22.		

PRICES FIG. 1202 INSIDE PIPE PULLER, MODIFIED.

Size pipe pulls .... Inches	4½	5	6	7	8	9	1
Pulling pipe connection* .... "	4½	4½	4½	4½	6	6	6
Wedge pipe connection .... "	1¼	1¼	1¼	1¼	1¼	1¼	1
Price, Fig. 1202, modified	$40.00	$45.00	$50.00	$55.00	$63.00	$72.00	$83
" **Extra Wedges**	5.50	6.00	7.00	7.50	9.00	10.00	11.

******Pulling pipe connection* **made one or two sizes larger for 12½% additional price.**

Pipe and Combination Vises.

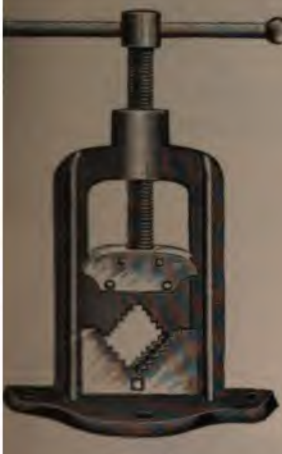


FIG. 32

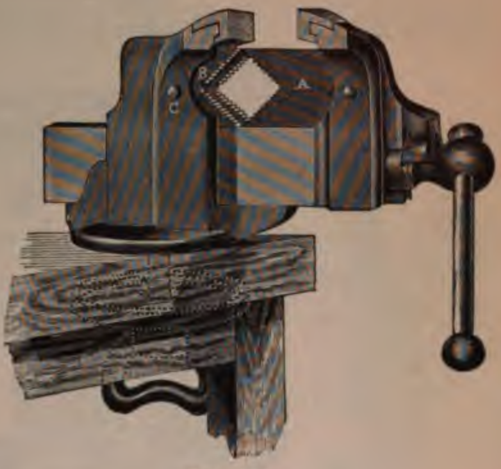


FIG. 262

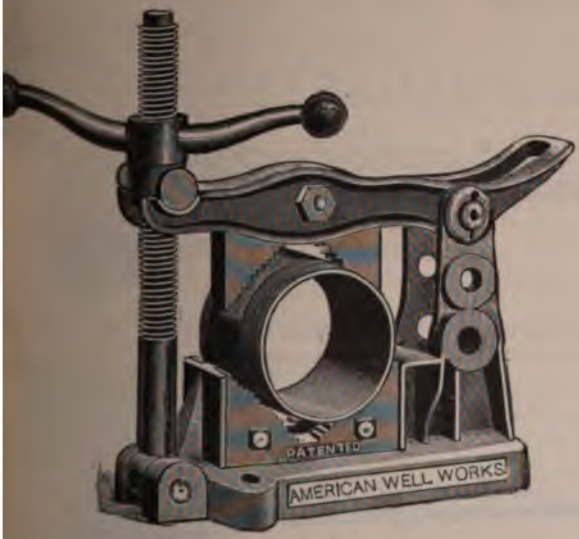


FIG. 234

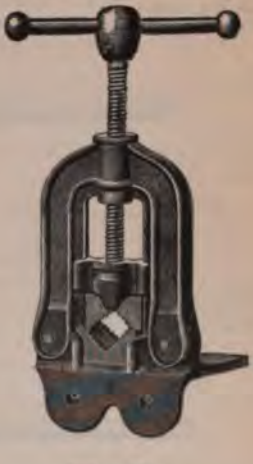


FIG. 1468

LIST PRICES FOR PIPE VISES.

	Size pipe holds.	Price.	Size pipe holds.	Price.
Fig. 32, Well-man's Babbitted Thread Vise.		$......	¼ to 3 inch	$ 6.00
234, " Heavy Vise	¼ to 4 inch	10.00	2 " 6 "	14.00
262, Combination Vise	⅛ " 2 "	7.00	¼ " 3 "	9.00
1468, Malleable Swing Vise	⅛ " 2 "	4.50	¼ " 3 "	6.50

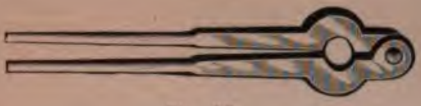


Fig. 30.

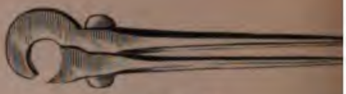


Fig. 33.

PRICES FIGS. 30 AND 33, SLIDE AND LIFT TONGS.

FOR LOWERING OR HOLDING DRILL RODS.

Size pipe for	¾	1	1¼	1½	2	2½	3	3½	4	4½	5
Price, Figs. 30 and 33	$ 3.50	$ 4.20	$5.00	$5.60	$7.00	$9.00	$11.00	$12.50	$14.	$16.	$18.

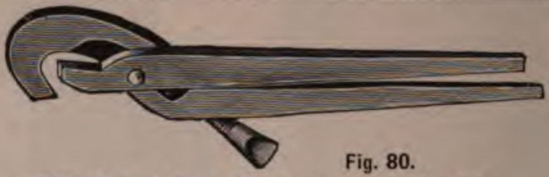


Fig. 80.

PRICES, FIG. 80, BROWN'S TONGS.

Number	1	1½	2	3	4
Size pipe turns, inches	⅛ to ¾	¾ to 1	½ to 1¼	1 to 2	2½ to
Price, Fig. 80	$1.30	$1.65	$2.00	$3 00	$6 00

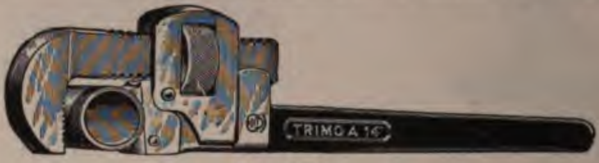


Fig. 1378.

PRICES, FIG. 1378, TRIMO PIPE WRENCH.

Length open, Inches	6	8	10	14	18	24	36
Size pipe turns, Inches	⅛ to ½	⅛ to ¾	⅛ to 1	¼ to 1½	¼ to 2	¼ to 2½	½ to 3½
Price, Fig. 1478	$2.00	$2 00	$2.25	$3.00	$4.00	$6.00	$12.00

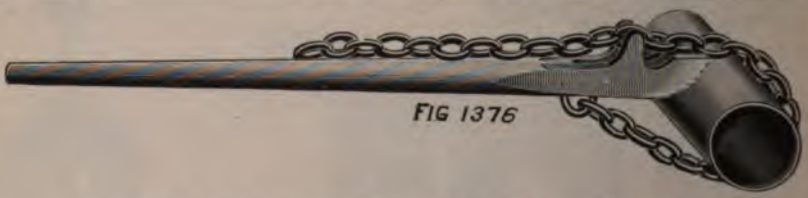


FIG 1376

PRICES, FIG. 1376, ROBBINS' CHAIN TONGS.

Number	2	3	4	5	6
Size pipe turns, Inches	1 to 2	1¼ to 4	2 to 6	2½ to 8	4 to 10
Apx. Weight, Lbs	7	12	24	33	50
Price, Fig. 1376	$5.50	$6.25	$9.00	$12.50	$16.00

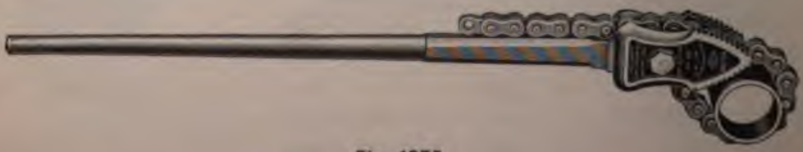


Fig. 1375.

PRICES, FIG. 1375 VULCAN TONGS--BEING IMPROVED BROCK TONGS

Number	10	11	12	13	13½	14	15
Size pipe turns, Inches	⅛ to ¾	½ to 1½	1¼ to 2½	¾ to 4	1 to 6	1½ to 8	2 to 12
Apx. Weight, Lbs	2	5	8	16	21	29	49
Price, Fig. 1375	$2.50	$3.50	$5.00	$7.00	$9.00	$11.00	$18.00

Pipe Cutters and Slotters.

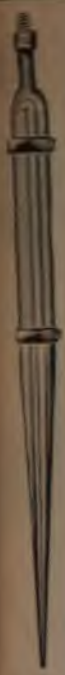


FIG. 67.

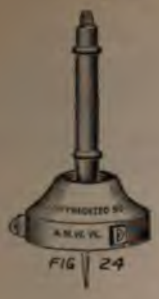


FIG 24

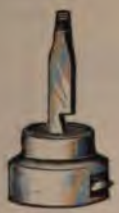


FIG. 363.

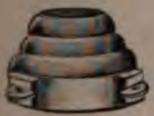


FIG. 1205.

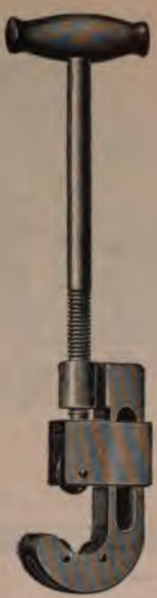


FIG. 1473.

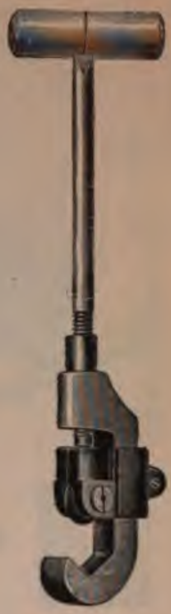


FIG. 1475.

Figs. 1205 and 67 together constitute an inside or underground pipe cutter for cutting off pipe below the surface. Fig. 1205 screws to a pipe which will pass inside of pipe to be cut off, and is held in position at surface by any convenient means, or by a turn table which we can furnish. Fig. 330 puller must be set with sufficient strain to part the cut pipe when the job is finished. The expanding pin Fig. 67, is let down inside cutter pipe, and forces cutters out against tubing to be cut off. As perfect, cuts may be made 2000 feet below the surface as on the surface.

Fig. 363, is a one wheel inside pipe cutter, and is used the same as Fig. 1205 save that the cutter is forced out by pulling up on an inside pipe.

Fig. 24 is an undergound pipe slotter, operated the same as Fig. 1205, except that it is made to split pipe vertically to let in water which has been shut off by the pipe, and the tool is raised and lowered instead of rotated.

PRICES FIGS. 1205-67 AND 363 CUTTERS, AND FIG. 24 SLOTTER.

Size Pipe will cut, Inches	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Size Pipe screws to. Odd sized shanks **10 per cent.** net extra	1¼	1¼	2	2	2	2	3	3	4	4	4	6	6
Price Fig. **1205-67** Inside Cut'r " " **24** Pipe Slotter	$......	$......	$......	$......	$26.	$36.	$48.	$57.	$70.	$80.	$95.	$110.	$140.
" " **363** Inside Cutter	12.	14.	16.	19.	22.	29.	36.	44.					

PRICES, FIGS. 1475 WALWORTH, AND FIG. 1473 BARNES, PIPE CUTTERS.

Fig. 1475, Number Pipe cuts, Inches	**1** ⅛ to 1	**2** ¾ to 2	**3** 2 to 3				
Price, Fig. 1475, Walworth Extra Wheels, each	$1.50 .12	$2.25 .18	$7.00 .25				
Fig. 1473, Number Pipe cuts, Inches	**1** ⅛ to 1	**2** ½ to 2	**3** 1½ to 3	**4** 2½ to 4	**5** 4 to 6	**6** 6 to 8	**7** 9 to 12
Price, Fig. 1473, Barnes Extra Wheels, each	$4.50 .25	$6 00 .30	$10.00 .40	$20.00 .50	$30.00 .75	$40.00 .75	$50.00 .75

Hand Pipe Threading Tools.

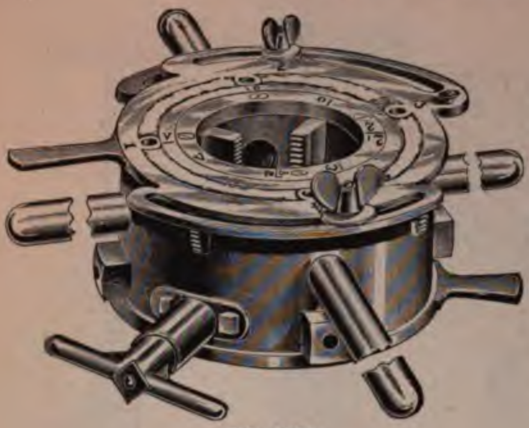


FIG. 1325.

FIG. 1325.

ADJUSTABLE SCREW PLATE

for cutting off and threading standard ir pipe. Large sizes threaded by hand by rur ning thread several times.

Number.	Sizes in inches iron pipe will thread and cut off.	Price Fig. 1325.	Price Extra Dies.	Pric Extr Knive
1	¼ to ¾	$14.00	$2.00	$ .4
2	½ " 1¼	16.00	2.00	.4
3	1 " 2	20.00	2.00	.4
3½	½ " 2	22.50	4.00	.4
4A	1½ " 3	35.00	3.00	.5
4B	2½ " 4	50.00	3.00	.5
5	4½ " 6	75.00	6.00	.7
5A	6 " 8 •	125.00	6.00	.7

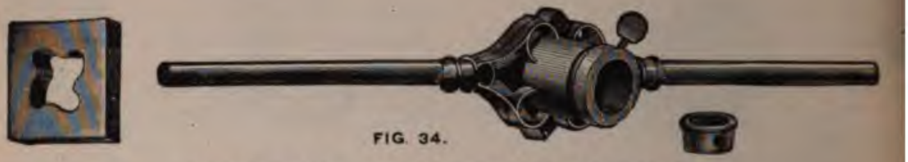


FIG. 34.

PRICES FIG. 34 DIE STOCK AND DIES.

Number.	Size Pipe Threads.	Dimensions Dies.	Price Complete.	Price Extra Dies.	Price Bushings
1	¼ to 1	2½ x 2½ x ¾	$15.00	$2.00	$ .35
2A	1, 1¼ and 2 in.	4 x 4 x ⅞	20.00	3.50	.60

Price each, **Die Frames** for using ¾ inch and smaller dies in No. 2A stock.................. $.

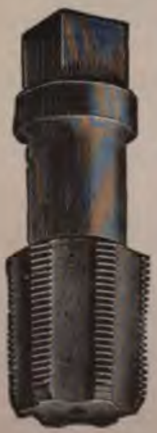


FIG. 95 TAP.

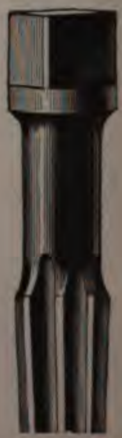


FIG. 96 REAMER.

PRICES FIGS. 95 OR 96 PIPE TAP OR REAMER.

Size, inches..................	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	
Taps and Reamers,..........	$1.12	$1.25	$1.50	$1.87	$2.50	$3.12	$3.75	$4.62	$6.25	$10.50	$15

Pipe Preparing Tools.

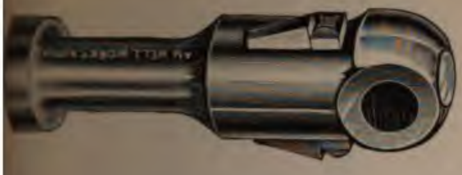


Fig. 76.

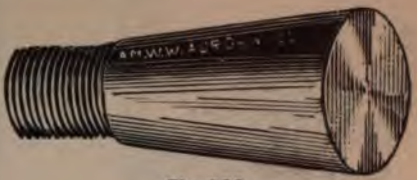


Fig. 523.

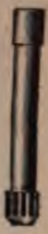


Fig. 1831.

PRICES, PIPE REAMERS AND DRIFTS.

Size pipe drifts out " " screws to*	2 1	2½ 1	3 1¼	3½ 1¼	4 1¼
Price, Fig. 523	$3.25	$4.30	$ 6.50	$ 7.50	$ 8.60
" " 1380	2.00	3.00	4.50	5.00	6.50
" " 1381	7.00	9.00	11.50	14.50	18.50
" " 76	1.40	2.00	2.90	3.50	4.20

*Tools with odd sized shanks charged **10 per cent. extra.**

DRILLER'S HAND TOOLS.

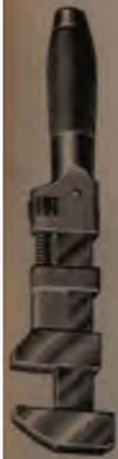


Fig. 1479.

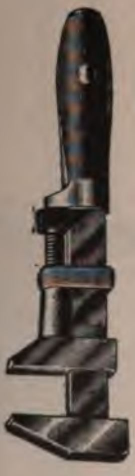


Fig. 1477.

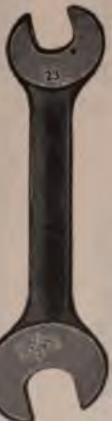


Fig. 1478.

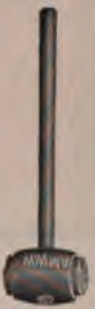


Fig. 1671.

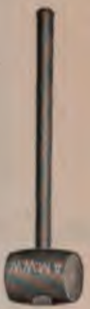


Fig. 1670.

RICES, FIG. 1477, KNIFE HANDLE, OR FIG. 1479 MONKEY WRENCHES.

open	6	8	10	12	15	18	21
Plain.	$ .75	$ .85	$1.00	$1.20	$2.00	$2.50	$3.00
Bright	.85	.95	1.20	1.40	2.20	2.70	3.25

1670, Cast Iron Maul, 13 Pounds each $1.40
1671, Wood Faced " 10 " " 1.60
" " " " 13 " " 1.80

1478, Engineers' Wrench is furnished plain or finished to fit U. S. standard nuts in variations of and two sizes from ¼ inch up. **Quoted on specifications**

Drillers' Smithing Tools.

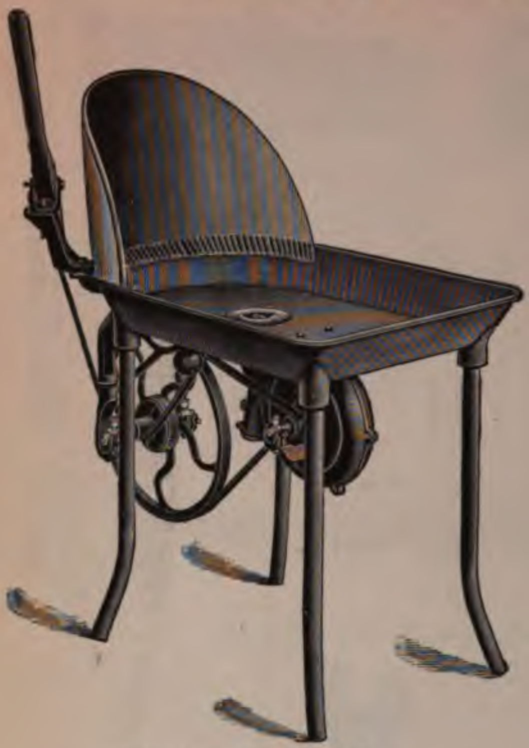


FIG. 1347. FORGE NO. 2.

FIG. 1674 BLOW

FIG. 1672.

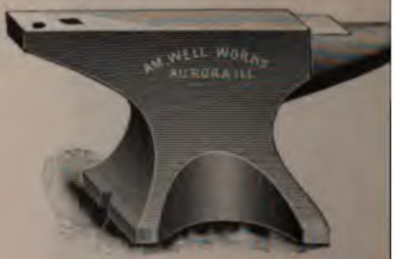


FIG. 1673.

PRICES OF SMITHING TOOLS.

Fig. 1347. Forge No. 2, suitable for heating 3 inch iron to welding heat and dressing 8 inch and smaller drills
" **1672.** Cast Steel Blacksmiths' Sledge, 12 lbs
" **1672.** " " " " 15 "
" **1673.** Anvil, Peter Wright, 85 to 500 lbs., per lb
" **1673.** " Vulcan, 80 to 150 lbs. " "
" **1674.** Blower, with 10 inch Fan
Tuyere Iron
Ball Pein Hand Hammer, 2 lbs
Smith Tongs, *per lb*

ROCK DRILLING TOOLS.

213.

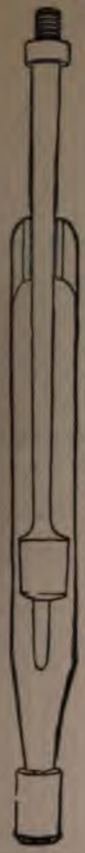


Fig. 1212.

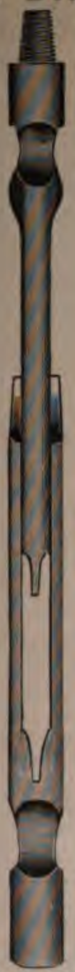


Fig. 1631.

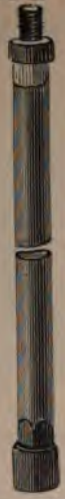


Fig. 1643.

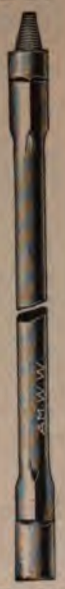


Fig. 1644.

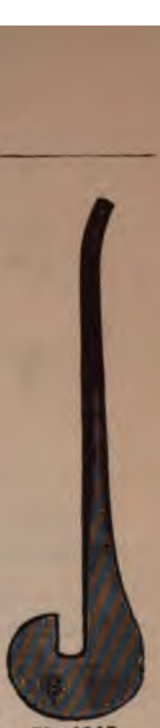


Fig. 1645

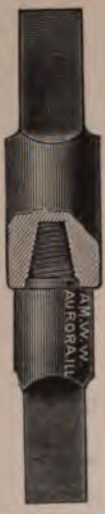


Fig. 661.

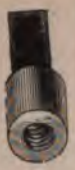


Fig. 1215.

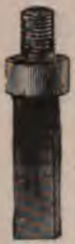


Fig. 1214.

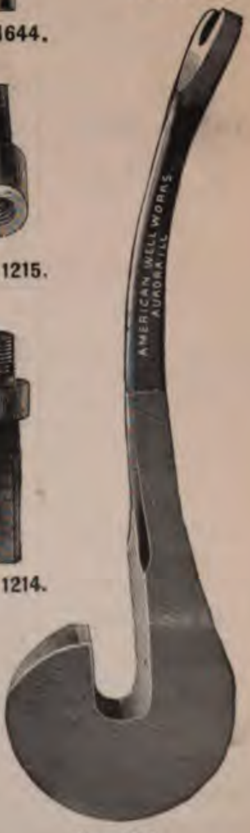


Fig. 1628.

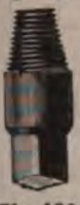
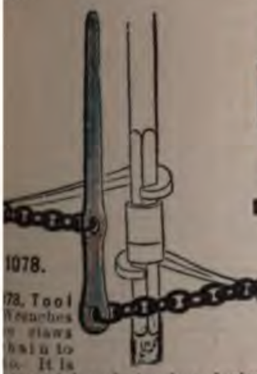


Fig. 402.



1078.

78, Tool Wrenches w jaws hain to o. It is powerful and simplest device ing or loosening tools.
.... $5.00.

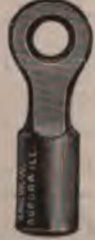


Fig. 666.

or prices of tools shown on this page, see next two pages.
e second page for dimensions of straight and taper joints used.

Rock Tool Drill Bars.

STRIGHT JOINT DRILL BARS, FIG. 1643, SHOWN ON PRECEDING

Diam. Bar........ Inches	Length Bar feet.	2	2	2½	3	3	3¼	3¼	3½	3½	3¾	4
Smallest hole for........		3	4	4	4	5	4	5	4	5	5	6
Size Joints used*........		A	B	B	B	D	B	D	B	D	D	D
STRAIGHT JOINT. Prices Fig. 1643 Bars.	**6**	$15.	$17.	$19.	$22.	$25.	$25.	$28.	$27.	$30	$34	$39
	8	16	18.	21.	25.	28	28.	31.	30.	33.	38	44.
	10	17	19.	23.	27	30.	30.	33.	33.	36	42.	49.
	12	18	20.	25	30.	33.	33.	36.	37.	40.	46.	53.
	14	19.	21	26.	33	36.	36.	39.	40.	44.	51.	59.

TAPER JOINT DRILL BARS, FIG. 1644, SHOWN ON PRECEDING PA

Diam. Bar........ Inches	Length Bar feet.	2	2	2½	2½	3	3	3	3¼	3¼	3¼	3½	3½
Smallest hole for........		3	4	4	4½	4	4½	5	4	4½	5	4½	5
Size Joints used*........		AA	BB	BB	CC	BB	CC	DD	BB	CC	DD	CC	DD
TAPER JOINT. Prices Fig. 1644 Bars.	**6**	$17.	$18	$19	$20.	$24.	$26.	$28.	$26.	$27.	$30.	$29.	$32.
	8	18.	19.	20.	22.	26.	28.	31.	29.	30.	33.	33	36.
	10	19.	20	22.	23.	28.	30.	33.	32.	33.	36.	36.	39.
	12	20	21.	23	25.	31.	33.	36.	35.	36.	39.	40.	43
	14	21.	22	25	27.	34.	36.	39.	38.	39	42.	43.	46
	16	22.	23.	27	28.	36	38.	41.	41	42	45.	46.	50
	18	23.	24	29.	30.	39.	41.	44.	44.	45	48	50	53.
	20	24.	25.	31	32.	41	43.	46	47.	48.	51.	53.	56.
	28	30.	31.	40	41.	54.	56.	59.	61.	62.	65.	70.	73.

Diam. Bar........ Inches	Length Bar feet.	3¾	4	4	4¼	4¼	4½	4½	4½	4¾	4¾	5	5
Smallest hole for........		6	6	6	6	6	6	8	9	8	9	8	9
Size Joints used*........		EE	DD	EE	DD	EE	EE	FF	GG	FF	GG	FF	GG
TAPER JOINT (Continued) Prices Fig. 1644 Bars.	**6**	$40.	$42.	$42.	$47	$50.	$55	$59.	$70	$65.	$77.	$71.	$82.
	8	45.	47	47.	53	56	61.	65.	76.	73.	84.	79.	90
	10	49.	52	52.	58	61.	67	71.	82.	81	92.	88.	99.
	12	53.	57	57.	64.	67.	74	78.	89.	89	100.	96	107
	14	57.	62.	62.	69	72	80	84.	95	96.	108.	105.	116
	16	61	68	68.	75.	78.	86	90	101.	104.	115.	114.	125.
	18	66	73.	73.	81	84.	93.	97.	108	112.	123.	122.	133.
	20	70.	78.	78.	87.	90	99.	103.	114.	120.	131.	131.	142.
	28	91.	104.	105.	116	120.	133	137.	148.	160.	171.	176.	187.

WEIGHTS APROXIMATELY PER FOOT OF DRILL BARS HERE LIS

Size Bar........ Inches	**2**	**2½**	**3**	**3¼**	**3½**	**3¾**	**4**	**4¼**	**4½**	**4¾**	**5**
Pounds per foot........	11	17	24	28	32	37	42	48	53	59	66

*See Dimensions Rock Tool Joints on another page.

Dimensions Rock Tool Joints.

	Joint Letter.	Smallest hole used in.	Diam. Pin.		Lgth. Pin.		Diam. Bx.		Threads.	Price.	Price.
ght	A	3	1½	x	2⅛	x	2½	x	6	Per Pr. $ 8.00	Pin Joint only $3.00
h. 1214	B	4	2	x	2½	x	3¼	x	6	" 10.00	" " " 4.30
215.	D	5	2½	x	2⅝	x	4¼	x	5	" 13.00	" " " 5.75
	AA	3	1¼ and 1¾	x	2½	x	2½	x	8	" 10.00	" " " 4.30
	BB	4	1 9-64 " 2	x	3	x	3	x	8	" 11.50	" " " 5.00
	CC	4½	1⅝ " 2½	x	3	x	3½	x	8	" 13.00	" " " 6.00
er s.	DD	5	2 " 3	x	4	x	4¼	x	8	" 16.00	" " " 8.00
61.	EE	6	2 " 3	x	4	x	4 11-16	x	8	" 18.00	" " " 8.00
	FF	8	2½ " 3½	x	4	x	5⅜	x	8	" 23.00	" " " 10.50
	GG	9	3 " 4	x	4	x	6⅝	x	8	" 34.00	" " " 15.00

44.

Fig. 1244, Reducing Stub. This is made with any desired combination of joints in both straight, taper, or both combined, to connect tools having different joints. In ordering, state size of wrench square you want.

Price of regular length is sum of the prices of the **two joints used.**

Prices, Jars, Rope Sockets, Loops.

WITH STRAIGHT JOINTS.

t hole works in..Inches	3	3½	3¾	4	4¼	4½	5
ints used*.............	A	A	A	B	B	B	D
11, Steel Swaged Jars...	$26.00	$31.00	$35.00	$37.00	$39.00	$41.00	$55.00
12. Guided Norway Jars	....	....	....	40.00	40.00	40.00	51.00
29, Rope Loop or Fig... 1213 Rope Socket...	8 50	9.00	10 00	11.00	11.50	12.00	15.00
6, Eye Loop...........	6.50	6.50	6.50	8.00	8.00	8.00	10 00

WITH TAPER JOINTS.

t hole works in. Inches	3	3½	3¾	4	4¼	4½	5	6	8	9
ints used*.............	AA	AA	AA	BB	BB	CC	DD	EE	FF	GG
11, Steel Swaged Jars...	$28.00	$33.00	$37.00	$39.00	$41.00	$44.00	$58.00	$61.00	$69.00	$93.00
29, Rope Loop, or Fig. 1213 Rope Socket...	9.00	10.00	11.00	12.00	13 00	14.00	17 00	19.00	23 00	34 00
3 Eye Loop..............	7.00	7.50	7.50	9.00	9.00	10.00	12 00	13.00	16.00	22 00

PRICES OF DRILL WRENCHES. FIGS. 1628 AND 1645.

ats for*................	A	B	D	AA	BB	CC	DD	EE	FF	GG
ening, inches..........	1⅞	2⅝	3⅛	1⅞	2¼	2⅝	3¼	3¼	4	4½
28, Drill Wrenches.....	$8 00	$8.50	$9.00	$8 00	$8 50	$8.75	$9.50	$11 00	$16.00	$20.00
5, " "	7.00	7.50	8.00	7 00	7.50	7 75	9.00			

etters refer to table on this page.

Rock Tool Drills.

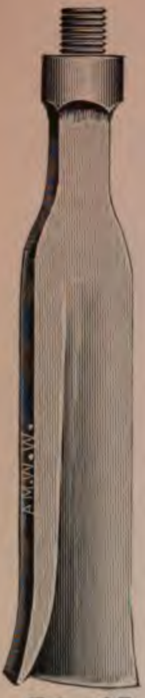


FIG. 45

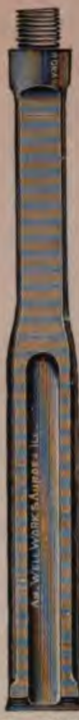

AM. WELL WORKS AURORA, ILL.

Fig. 1207

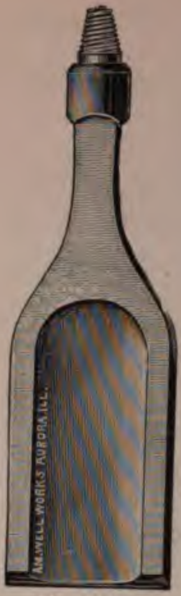

AM. WELL WORKS AURORA, ILL.

Fig. 614.

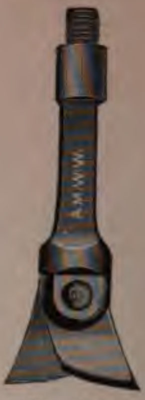


Fig. 1630.
(See foot note.‡)

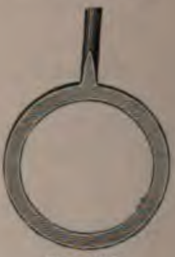


Fig. 662.

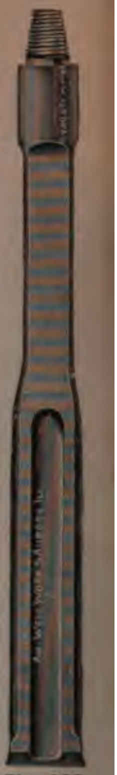


Fig. 605.

PRICES, FIGS. 45, 605 AND 1207 HARD ROCK DRILLS.

TAPER PIN.				STRAIGHT PIN.	
Size† Hole Drills.	Wt. Steel used	Size* Joints used.	Figs. 45 605 and 1207.	Size Joints*.	Figs. 45. 605 and 1207.
3	20	AA	$10.	A	$ 9.
3½	25	AA	12.	A	11.
4	30	BB	16.	B	15.
4½	40	CC	20.	B	19.
5	50	CC	24.	..	...
5	50	DD§	25.	D	24.
6	75	DD	29.	D	28.
7	95	DD	32.		
8	120	DD	37.		
8	120	FF	40.		
9	140	DD	47.		
9	140	FF	50.		
10	150	FF	55.		
10	150	GG	60.		
12	175	FF	66.		
12	175	GG	75		

†Intermediate sizes at price next larger.

*See Dimensions Rock Tool Joints on another page.

§**DD** and **EE** pin joints are **identical.** Use DD pins for *EE joints.*

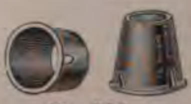


Fig. 669.

Thread Protectors, inside or outside thread, taper or straight, each **50c**

Fig. 662 Gauge to measure drills when sharpening.

Size Drills for, in.	Price, each, Fig. 662.
3 to 5⅝	$1 30
6 " 8	1.80
8¼ " 12.	2.50
Larger	4.00

FIG. 1630‡ SOLID PADDY DRILL FOR SHALE AND SOFT FORMATIONS.

Size Pipe enters and sinks.	Taper Pin.		Straight Pin.	
	Size Joint.*	Price	Size Joint.*	Price.
4	BB	$17.	B	$16
4½	CC	22.	B	19
5	CC	26.	..	..
5	DD§	27.	D	24
6	DD	36.	D	33

Is made with center blade like Fig. 27 unless expressly ordered as shown.

FIG. 614, FLUTED SPUDDING DRILL.

Size† Hole Drills.	Size* Joint Used.	Price.
8	DD	$34.
8	FF	38.
9	DD§	43.
9	FF	47.
10	"	50.
10	GG	56
12	FF	60
12	GG	68
15	"	80
18	"	90

Sand Pumps and Bailers.

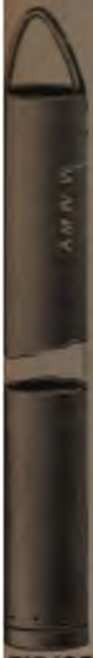


FIG 135

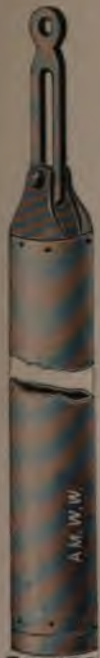


FIG 136

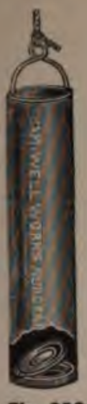


Fig. 253.

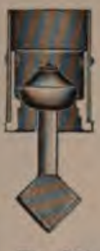


Fig. 421.
Steel Dart.

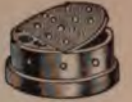


Fig. 78.
Malleable.

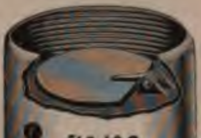


FIG 138
Hvy. C. C. Steel.

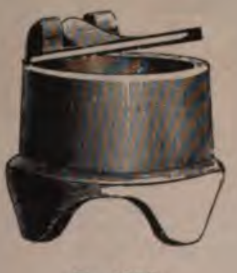


Fig. 1250.
Fluted Bottom.

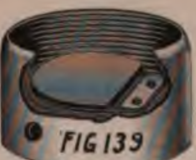


FIG 139
C. C. Steel.

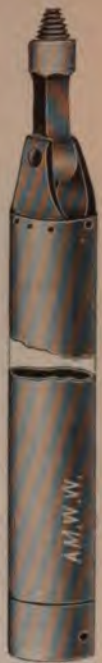


FIG 137

Fig. 135, Bale Sand Pump, with Fig. 78 bottom. **Fig. 136**, Jar Sand Pump, with Fig. 78 bottom, ars loose if wedged in hole. **Fig. 137**, Drilling Sand Pump, for Sinking through Sand and Gravel. ig. **253**, Galvanized Iron Sand Pump.

PRICES 6 FT. (LONGER EXTRA*) SAND PUMPS, EXCEPT FIG. 253.

utside Diameter............Inches ode for Outside Diameter............Only	Code for Kind of Pump.	1⅝ Sayul	2⅜ Seba	2⅞ Sece	3½ Sedg	4 Sefo	5 Segl	6⅝ Sehi	7⅝ Seim	8⅝ Sejo
ig. 135 having Fig. 78 bottom............	Sazl	$3.50	$4.60	$ 6.20	$ 7.70	$ 9.20	$12.20	$15.00	$18.70	$23.50
" 135 " " 128 "	Sade	......	......	13.30	16.00	18.80	23.00	27.50		
" 135 " " 129 "	Safi	......	......	7.70	9.35	11.20	14.40	17.50	21.70	26.75
" 135 " " 421 "	Sahn	......	......	8.40	10.10	12.20	15.40	18.75	23.00	28.25
" 135 " " 1250 "	Sakl	......	......	7.70	9.35	11.20	14.40	17.50	21.70	26.75
" 136 " " 78 "	Salm	3.75	5.25	7.20	9.20	11.20	15.00	18.20	25.80	28.30
" 136 " " 138 "	Samo	......	......	14.30	17.50	20.80	25.80	30.70		
" 136 " " 139 "	Sanp	......	......	8.70	10.85	13.20	17.20	20.70	28.80	31.50
" 136 " " 421 "	Savl	......	......	9.40	11.60	14.26	18.20	22.00	30.15	33.50
136 " " 1250 "	Saps	......	......	8.70	10.85	13.20	17.20	20.70	28.80	31.50
" 137 size of Pin Joints†	....	......	......	......	**BB**	**DD**	**DD**	**DD**	**DD**	**DD**
" 137 Drilling Sand Pump............	Saqu	......	......	......	29.00	37.00	44.00	50.00	56.00	63.00
*Additional length for above Sand Pumps to 18 ft..........per foot	...	.20	.33	.50	.70	.85	1.25	1.60	2.10	2.70
Fig. 253 No. Galv. Iron made of........	....	......	......	......	......	**24**	**24**	**24**	**16**	**16**
" 253 3 feet long............	Sart	......	......	......	......	5.50	5.90	6.70	8.40	10.00
" 253 For each additional 2 ft. length, add...	....	......	......	......	......	2.50	2.70	3.00	3.75	4.10
Fig. 78 Leather Faced Bottom............	Saso	1.00	1.20	1.40	1.70	1.90	2.20	2.50	2.90	3.75
" 138 Metal Valve "	Sath	......	......	8.50	10.00	11.50	13.00	15.00		
" 139 Leather Faced "	Sauj	......	......	2.90	3.35	3.90	4.40	5.00	5.90	7.00
" 421 Dart Valve "	Savx	......	......	3.60	4.10	4.90	5.40	6.25	7.25	9.00
" 1250 Metal Valve "	Sawz	......	......	2.90	3.35	3.90	4.40	5.00	5.90	7.00
" 137 Bottom only, Forged Steel............	Sax	......	......	......	10.00	12.00	14.20	17.00	19.00	21.00

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†See "Dimensions Rock Tool Joints" on another page.

Temper Screw, Drive Heads, Clam

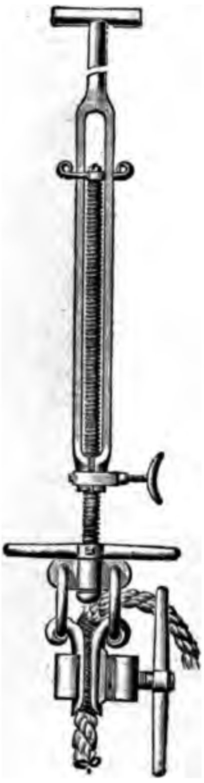


Fig. 140.

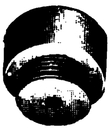


Fig. 1080.

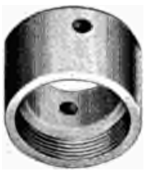


Fig. 1081.

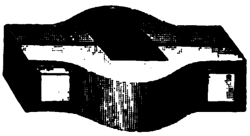


FIG 1076

Fig. 403.
Belt Clamps.

Fi
B
C

Fig. 140 is Temper Screw for use with cable rock drillin It is carried by the walking beam and grips the drilling cable for raising and dropping the string of tools. As the hole is fed down by the screw.

Fig. 1080 is Solid Drive Head for use in driving pipe, and top coupling on pipe.

Fig. 1081 is Hollow Drive Head used like Fig. 1080, sav over the pipe without coupling.

Fig. 1076, Driving Clamps. are used for driving pipe by fastening them to the top sq 1644 drill bar. The drill and bar is run into the pipe and raised and dropped, the clamps top of Fig. 1081, thus driving the pipe.

Prices, Fig. 140 Temper Screw, with **4** Ft. Feed, **1½** In. Screw, ...
" " **140** " " " **5** " " **1½** " " ....
" " **140** " " " **5** " " **1⅝** " " ....

Made with **ball bearing** for **12½** % net extra, and made with eye instead of tee hea price, if preferred.

Fig. 1079, Forged Bull Rope Coupling ....
" **1076,** Drill Bar Pipe Driving Clamp, for **3¼** In. and **smaller** bar, ...
" **1076** " " " " " " **4** to **5** In. bar, ...

PRICES OF SOLID AND HOLLOW DRIVE HEADS.

Size pipe for*...................**Inches**	**2½**	**3**	**4**	**4½**	**5**	**6**	**7**	**8**	**9**
Fig. 1081, Hollow Drive Head,....	$5.00	$5.80	$7.50	$8.25	$9.00	$10.	$11.	$13.	$15.
" **1080,** Solid " "	3.00	3.80	4.75	5.50	6.25	7.	8.	9.	10.

****Intermediate sizes*** **made for price of next larger listed.**

Rock Tool Reamers.

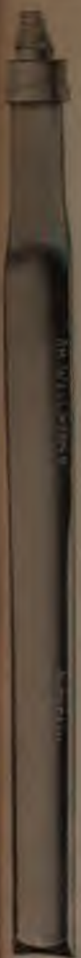


FIG. 637.

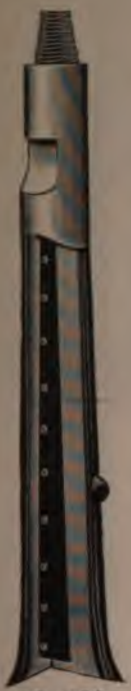


FIG. 1204

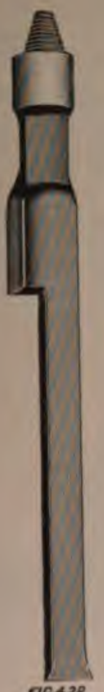


FIG 428

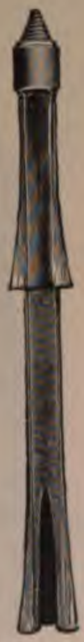


FIG. 1217.

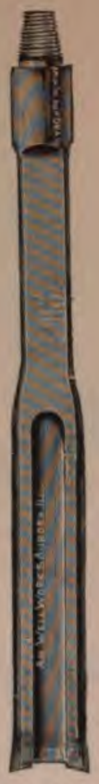


FIG. 1218.

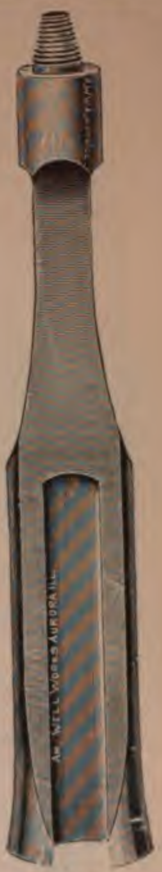


FIG. 606.

Fig. 428, Shoulder Reamer, drills hole and enlarges it so pipe will follow.
" **606,** Fluted Reamer, cuts two-thirds of circle and trues hole in which are bunches.
" **637,** Spudding Reamer, drills around tools fast in hole to loosen them.
" **1204,** Hard Rock Reamer, passes through a well pipe, and reams hole already drilled to permit pipe to follow. It is the most practical expansion reamer on the market.
Fig. 1217, Double Star Reamer, made to straighten hole with short crooks or offsets.
" **1218,** Fluted or Flat Reamer, trues hole in which are bunches.

PRICES OF ROCK REAMERS FOR CABLE AND POLE TOOLS.

Size hole enters.	Size* Joint.	Fig. 428 or 606.	Fig. 637. (8 Ft.)‡	Fig. 1204.	Fig. 1217.	Fig. 1218.
4	BB	$20.	$11.	$ 85.	$ 26.	$16.
4½	CC	22.	13.	90.	29.	20.
5	CC	26.	15.	125.	34.	24.
5	DD†	28.	17.	127.	36.	26.
6	DD	36.	27.	150.	45.	29.
7	DD	45.	35.	170.	60.	32.
8	DD	55.	40.	200.	73.	37.
8	FF	59.	44.	204.	77.	41.
9	DD	62.	46.	225.	82.	47.
9	FF	66.	50.	229.	86.	51.
10	FF	75.	59.	275.	98.	60.
10	GG	81.	65.	281.	104.	66.
12	FF	90.	70.	335.	109.	76.
12	GG	96.	80.	341.	115.	82.

*See dimensions of Taper and Straight Pin Joints on another page. All Hard Rock Reamers with regular straight pins without extra charge.

‡For each addition **2 feet** added to length of Fig. 637, increase list price by 15 **per cent.**

†**DD** and **EE** pin joints are **identical.** Use DD pins for EE box joints.

Deep Well Fishing Tools.

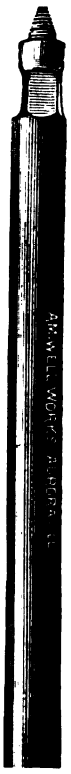


FIG. 672.

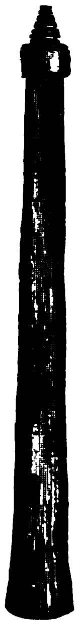


FIG. 241.

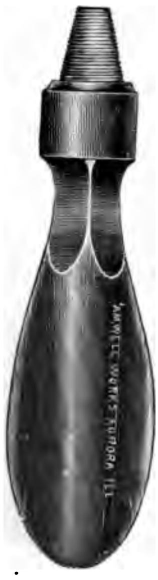


FIG. 670.

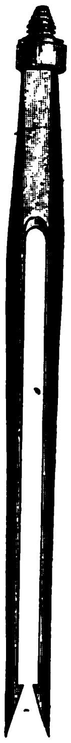


FIG. 1246.

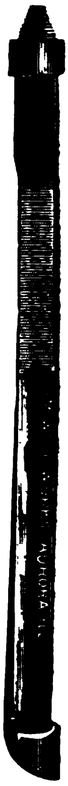


FIG. 673.

Fig. 241. Horn or Friction Socket Grab. It grabs by wedging on a lost tool.
" **670.** Pipe or Casing Swage for expanding well casing mashed in sinking.
" **672.** Friction Socket to remove loose tools from a well.
" **673.** Side Hook for straightening up and taking hold under shoulder of a tool.
" **1246.** Grab for removing lost tools by slipping over them.

PRICES‡ FIGS. 241, 670 AND 672 TOOLS.

Size hole for, inches " **Joints***	4 AA	4½ CC	5 DD	6 DD	6 EE	8 DD	8 EE	8 FF
Fig. 241 †	$......	$......	$22.	$23.	$23.	$30.	$32.	$3
" **670**	16.	20.	25.	29.	29.	37.	37.	4
" **672**	....	....	25.	26.	26.	33.	36.	3

†**Price of Bowls** to attach to **Fig. 241** Horn Sockets to adapt socket to larger holes, add to socket per inch of diameter of hole bowl is to be used in .... **$1.**

Price of Fig. 673 of 2½ inch steel, with **DD*** joint for 5 inch hole or larger **$28**
" " " " " 4¼ " " " **FF** " " 8 " " " " .... **36.**
" " " " " 4¼ " " " **GG** " " 10 " " " " .... **40.**
" " " **1246** to go in 6 inch or larger hole, DD joint .... **65.**

***See Dimensions Rock Tool Joints on another page.**

‡Intermediate sizes of all tools listed on this page to fit standard pipe or oil well casing made ***prices of next larger listed.*** **Straight joints used when ordered.**

Deep Well Fishing Tools.

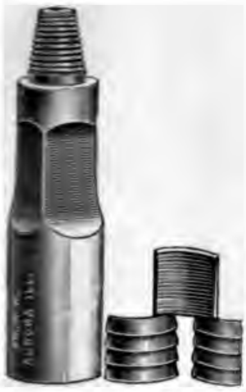


FIG. 629.

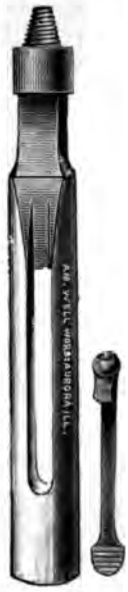


FIG. 678.

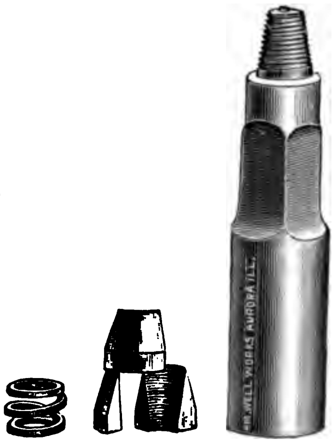


FIG. 628.

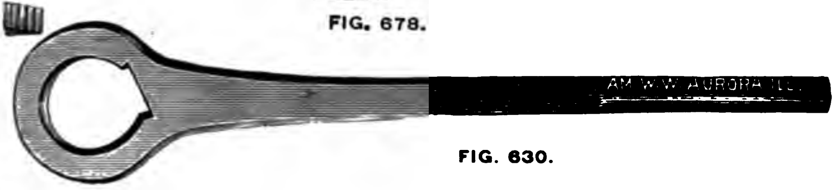


FIG. 630.

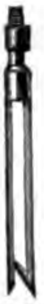


FIG. 413.

Fig. **413.** Sand Pump or Bailer Grab for catching lost sand pump bale.

" **628.** Pin Socket to take hold of pin of a tool unscrewed in a hole.

" **629.** Collar Socket, to take hold of collar of a tool in a hole when pin is broken off.

" **630.** Pin Socket Wrench for removing bottom part of Fig. 628 or 629 to remove dies.

" **678.** Jar Slip Socket for catching rein of broken jars.

PRICES FIGS. 413, 628, 629 AND 678 FISHING TOOLS.

Smallest size hole for	**4'**	**5**	**8**
Joint used*	**CC**	**DD**	**EE**
Price Fig. 678	$40.	$48.	$56.
" " **413**, Grab	16.	20.	
" " **628** or **629**	36.	44.	60.

Fig. 630. Socket Wrench for Figs. 628 and 629 each, **$15.00**

*See Dimensions Rock Tool Joints on another page.

Rope Fishing Tools, Measuring Line.

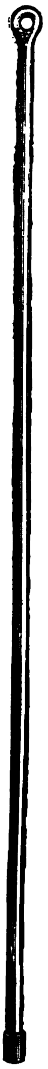


Fig 675.

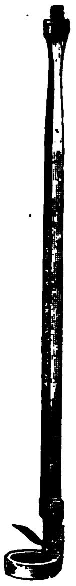


Fig. 642.

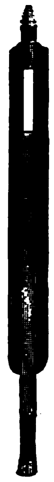


Fig. 643.

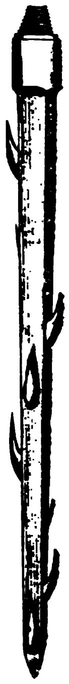


FIG 1242

Fig. 642, Rope Knife for cutting off rope attached to tools fast in hole.
" **643,** Rope Knife Jar used with Fig. 642.
" **675,** Sinker Bar for use with Fig. 643.
" **1242,** Rope Spear for grabbing broken off rope attached to tools under ground.

Price of Fig. 642, Rope Knife	**$12.**
" " " **643,** " " Jar	**14.**
" " " **675,** Sinker Bar (of 2" iron 12 feet long)	**12.**

Figs. 642, 643 and 675 have taper joints with pin diameter 1 inch and 1½ inch. p length 2¼ inches and box diameter 2 inches.

FIG. 1242, ROPE SPEAR.

Smallest hole for	4½	5	4½	5
Size Joints*	B	D	CC	DD
Price	$16.00	$19.00	$32 00	$35.00

*See dimensions of Rock Tool Joints, on another page.

STEEL TAPE MEASURING LINE.

We made and sell a convenient steel line for accurately measuring the depth of holes. It spotted every fifty feet and reeled on suitable reel for conveniently handling into and out of well.

Length Line........feet	500	750	1000	1500	2000
Price Steel Measuring Line and Reel	$12.	$16.	$20.	$26.	$30.

Pipe Elevators and Hoisting Tools.

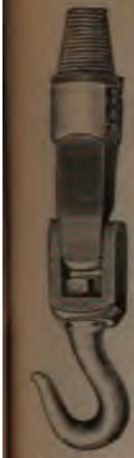


FIG. 663.

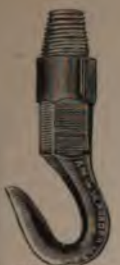


FIG. 664.

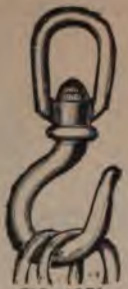


FIG. 1651.

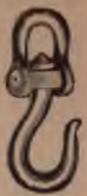


FIG. 1148.

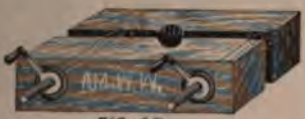


FIG 46

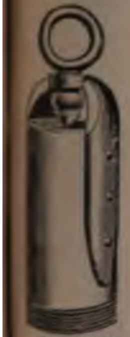


FIG. 874.

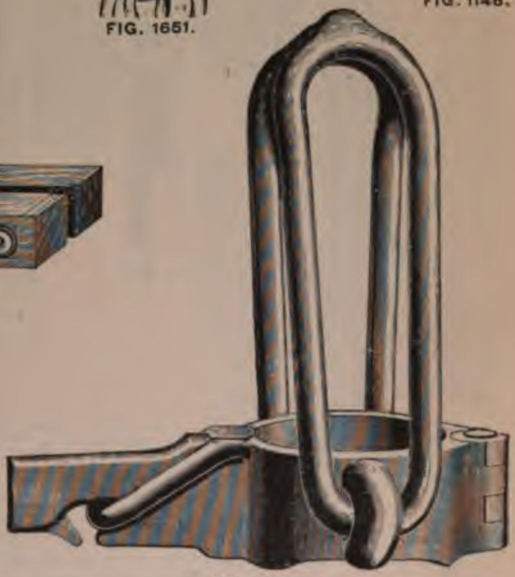


FIG. 1238.

PRICES OF HOISTING HOOKS, FIGS. 663, 664, 1148 AND 1651.

Size of joints*	....	....	DD	EE	FF
Size of iron in hook	1	1¼	1½	1¾	2
Price, Fig. 663, Swivel Hook	$......	$......	$20.	$30.	$47.
" " 664, Hook	....	....	10.	15.	23.
" " 1148, Swivel Hook	5.	8.	12.	17.	21.
" " 1651, " "	3.	6.	10	12.	16.

*See dimensions of drill joints on another page.

PRICES OF WOOD PIPE CLAMPS. FIG. 46.

Size of Timber used	6 x 6	8 x 8	10 x 10	12 x 12
Diameter of rods used	1¼	1⅜	1½	1⅝
Price of Fig. 46 Pipe Clamps	$7	$10.	$15.	$22.

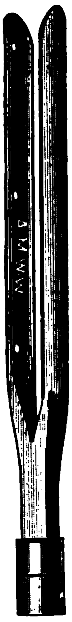
PRICES, FIG. 1238 ELEVATORS AND FIG. 874 PIPE SWIVEL.

Size Pipe will pull, inches	2	2½	3	3½	4	4½	5	6	7	8	10
Fig. 1238, Malleable, per pair (2)	$8.80	$9.50	$10.50	$11.50	$12.00	$14.00	$16.00	$21.00	$.....	$.....	$.....
" " Wro't Iron, " " "	......	......	......	......	......	42.00	44.00	47.00	50.00	56.00	70.00
" 874, Pipe Swivel, each	......		3.00	3.50	4.50	5.75	7.00	8.50	9.50	11.00	14.00

Intermediate sizes at price of next larger.

Pole Rock Drilling Tools.

For Pole Rock Drilling Tools not here listed, see other pages Rock Drilling Tools. We both Standard and Piston Drilling Jars for pole rigs.



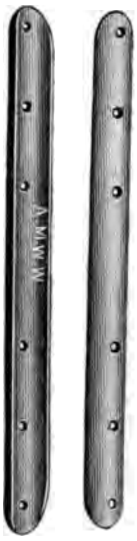


Fig. 1648

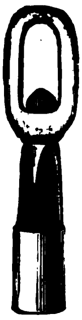


Fig. 927.

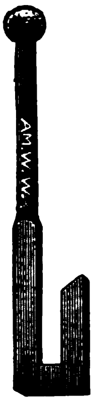


Fig. 1654.

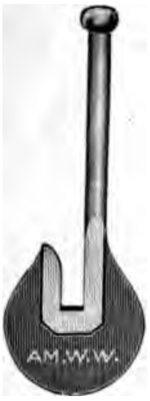


Fig. 1655.

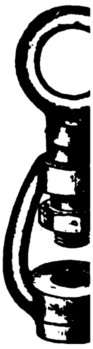


Fig. 9

Fig. 927, Drilling Pole Swivel. has standard taper pole joint.
" **928,** " " Hand Swivel " " " " "
" **878,** " " Grab " " " " "

STANDARD TAPER POLE JOINT, FIG. 242.

Diameters Pin.	Length Pin.	Outside Diam. Box.
1 in. and 1½ in.	2¼ in.	2 in.

Fig. 8

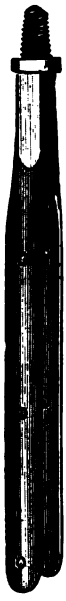


Fig. 242.

Drilling Poles, 2-in. round, Coupled with Fig. 242 Couplings, alternate joints spliced with Fig. 1648 Straps.......................................**per 100 feet**
Drilling Poles, only, 2-in. round. .... " " "
Fig. 242, Standard Wrought Drilling Pole Couplings, per set ....
Box Half of Coupling only...
" **1648,** Wrought Drilling Pole Straps, per set.......................................
" **1654,** Drilling Pole Hand Wrench...
" **1656,** " " Bench Wrench...
" **878,** Drill Pole, or Sucker Rod Grab...
" **927,** Drilling Pole Swivel...
" **928,** " " Hand Swivel...
Socket Drilling Pole Grab, (not illustrated) catches under coupling by quarter turn. Regular length takes in 6 feet of pole (may be made longer by screwing in pipe) has standard pole pin on top..

Earth Excavators and Drive Well Rig.

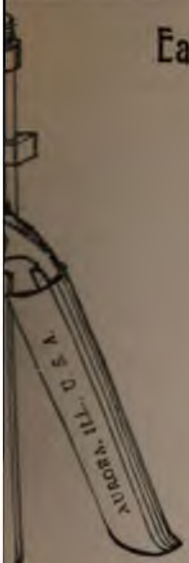


Fig. 1312.

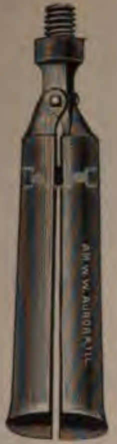


Fig. 680.

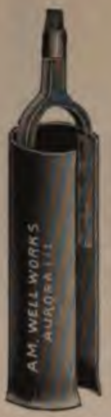


Fig 267.

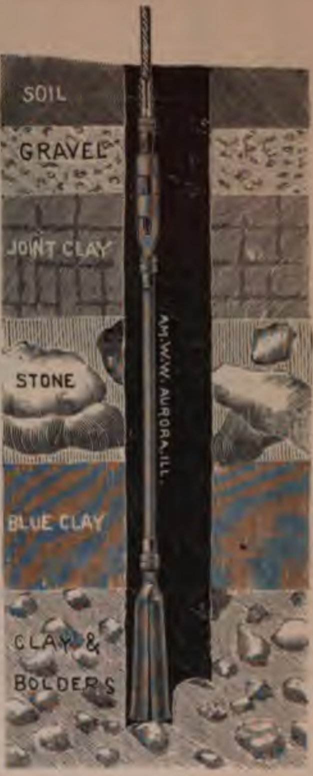


Fig. 682.

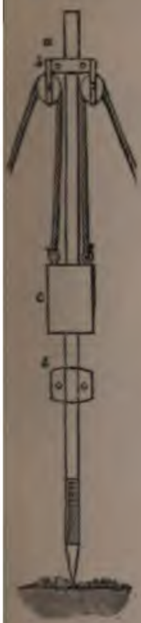


Fig. 545.

Fig. 1312 is an Earth Drill, very heavy; a collar is driven over the tong to hold it closed. By driving up the collar, one-half will swing open, discharging the contents easily. This is a valuable tool, and is used for starting a well where there is deep soft drilling. Used with cable or pole tools.

Fig. 680, an Adjustable Excavator. Can be adjusted to wedge over loose stones and boulders. With or without Pawls.

Fig. 267 is an Excavator or Drop Auger, for use on cable or pole tools in sinking through clay and soft surface material. The force of the drill bar drives it down filling it, then it is drawn out and emptied and the operation repeated.

Fig. 545 is a **Drive Well Rig,** for driving wells by hand, with two men, one pulling on each rope to raise the drive weight and to let it fall upon the clamp, which is firmly secured around about the piping.

Price Fig. 545, for driving 1½ inch Pipe, Tackle, Rope and Clamp.....$15.00.
" " " " 2 " " " " " " ..... 20.00.

(Prices include the whole Paraphernalia, but not the Piping.)

PRICES AND SIZES FIGS. 267, 680 AND 1312 EXCAVATORS.

(EACH HAS A POD 30 INCHES IN LENGTH.)

d Hole will Excavate, inches	6	8	10
s. **680** and **1312** (with Straight "D" Joints)*	$32.00	$44.00	$55.00
680 and **1312** (with Taper "DD" Joints)*	34.00	46.00	57.00
267 (with Straight "D" Joints)*	22.00	30.00	40.00
267 (with Taper "DD" Joints)*	24.00	32.00	42.00

*Explanation of Sized Joints, see Cable Tool Drilling Jar page.

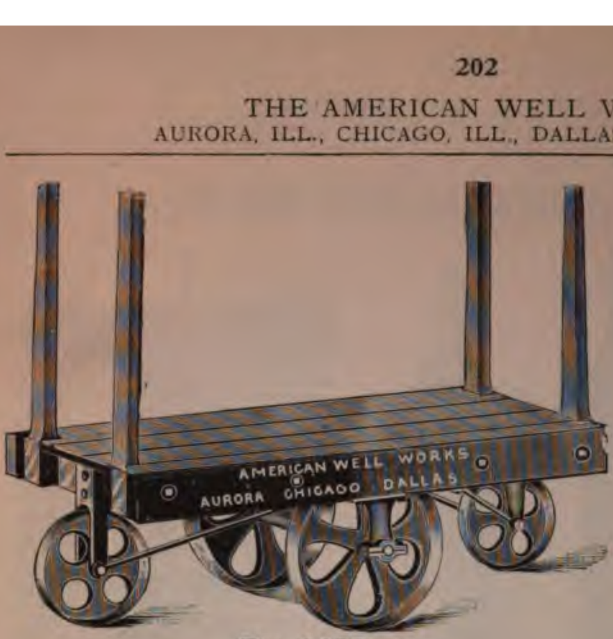


Fig. 1483 shows our w house cart. It should be lo so as to nearly balance and it can be turned on the ce wheels easily. It is made 30 x 57 inch platform.

Price...............**$12.5**

Fig. 1483.

Hand and Power Winches.

Fig. 831 illustrates a Hand Winch. We make them in several sizes, with loose and Drum, with Automatic and Friction drop, and of various plans to suit the wants. We ca illustrate all of the plans we make, but if you will kindly state what you want we will quote you prices. We also make them with our patent Dropping Mechanism, for hoisting and pile driving by hand, horse or other power, so that it will drive a pile striking it automatically, at the rate of 40 to 60 blows per minute, having an adjustment to follow the pile down without stopping.

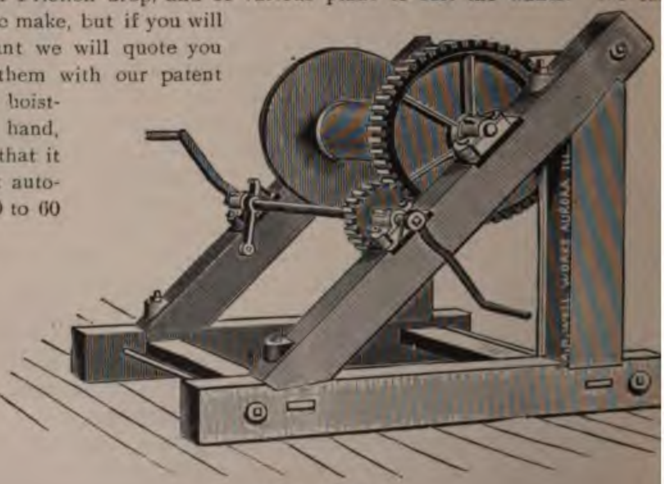


Fig. 831.

Price suitable to lift 1000 lbs. as shown........................**$3**
Price with Automatic Drop of Fig. 600-A........................**6**
(Other sizes on specifications.)

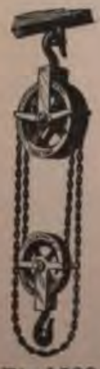


Fig. 1522.

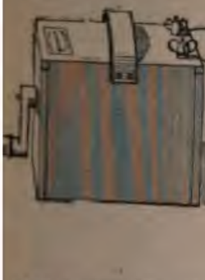
WESTON'S DIFFERENTIAL BLOCKS, FIG. 1522.

Capacity, tons	¼	¾	½	1	1½	2
Regular Hoist, feet	5	6	7	8	8½	9
Weight, pounds	11	22	30	51	81	122
Price, each	$	$	$15.00	$20.00	$25.00	$30.00
Extra Hoist, per foot			1.52	1.60	1.68	1.76
Extra Chain, per foot			.38	.40	.42	.44

ELECTRIC BLASTING OUTFITS.

R USE IN REMOVING OBSTRUCTIONS OR TO INCREASE THE FLOW OF WATER IN TUBULAR WELLS.

outfit consists of a magneto battery, double strand copper water insulated wire for depth required, electric s and the dynamite. The copper cable is composed of two heavy insulated wires which are covered and gether by another and still heavier insulation. Make tin tubes of suitable size to go down the hole that to explode the charge in, place the dynamite inside (charge will vary from one to fifty pounds accord- hat you wish to accomplish), place a small amount of common gun powder on the top of the dynamite, the electrical exploder is imbedded; then a water tight joint is made between the wire attached to the r and the shell containing the charge; this can be done by crimping the shell or by using paraffine from . The charge is then lowered into the hole by the copper cable until it reaches the point at which the s to be exploded, then secure the wire and when everything is ready attach the other ends of the copper the two posts of the battery. Secure the battery firmly by fastening or by holding with one hand and giv- rank a sudden and sharp turn, this will convey the electric charge to the dynamite. The charge can be under the water providing the insulation is perfect between the shell containing the charge and the insu- re, but we would suggest that it is better to raise the pipe or casing if any in the hole, several feet away e charge.



1498, Magneto Battery.

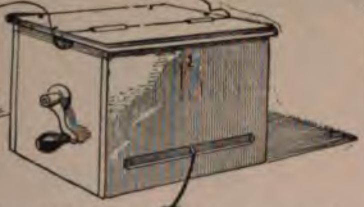


Fig. 1498-A, Reel Box for conveniently holding Discharge Wires.

Fig. 1500, Coil Double Strand Copper Cable.

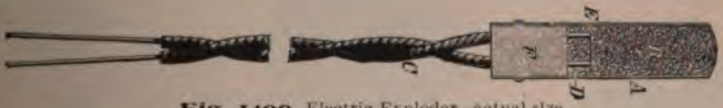


Fig. 1499, Electric Exploder—actual size.

PRICES WELL BLASTING OUTFITS.

gneto Battery, **Fig. 1498**	Net, $17.00
. **1498-A**	7.00
Strand Rubber Insulated Copper Discharging Wire, per 100 Ft	2.75
Strand Composition Insulated Copper Discharging Wire, per 100 Ft	1.75
rs, **Fig. 1499**—4 Ft. Wires, per Doz	.60
ng Tape for Covering Splices, per Roll	.60
ir, 60 per cent., in 25 Lb. Lots, (none less)	.30

GASOLINE AND GAS ENGINE BATTERY CELLS.

ig. 1640 illustrates our No. 2 Sampsom Battery Cell complete for use in making up batteries for ignit- charges in Gasoline or Gas Engine cylinders.

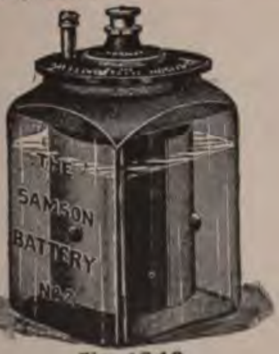


Fig. 1640.

ch Cell, **FIG. 1640**	$1.20	6 Inch Spark Coil	$1.70
Battery Box only	2.01	8 " " "	2.00
" " "	2.25	10 " " "	2.30
witch	.60	Binding Posts, each	.20
"	.75		

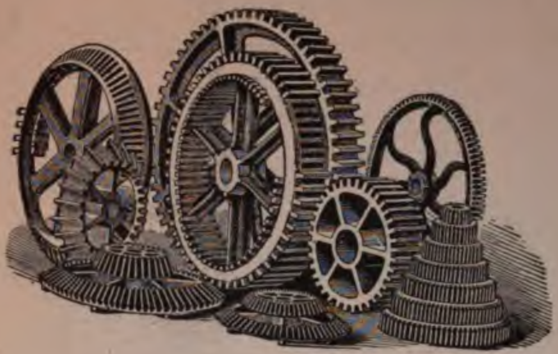


Fig. 1484.

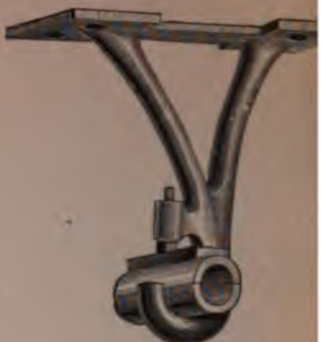


Fig. 298. Hanger.

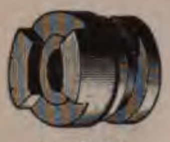


Fig. 1486.

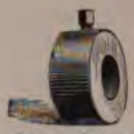


Fig. 295. Set Collar.

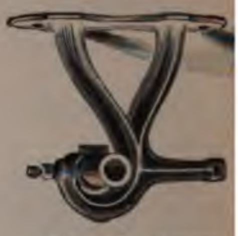


Fig. 297. Hanger.

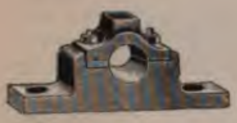


Fig. 1252.

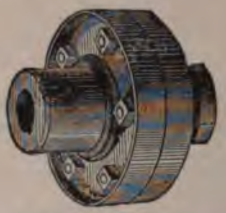


Fig. 294. Shafting Coupling.

Gears, moulded or machine cut, made to meet specifications. Get our prices on what you w

PRICES CLUTCHES, SET COLLARS, COUPLINGS, BOXES AND HANGER

Size Shaft for.	Fig. 1486. Bored and Keyseated.		Clutch Lever	Set Collars.			Fig. 294. Bored and key-seated with bolts	Fig. 1252, or Flat Boxes, Babbitted.		Figs. or 2 Han 14 Dr
	With Clutch, not shown.	as shown.	and Fulcrum only. Not shown.	Cast Iron, Safety.	Steel, Safety.	Steel Plain, Fig. 295		Not Planed No Bolts.	Planed. No Bolts.	
1 3-16	$ 8 75	$ 5.25	$ 5 00	$1.20	$ 4 00	$ 2 40	$ 8.00	$ 3.30	$ 4.00	$ 7.
1 7-16	9 50	5.75	6 00	1.25	4.10	2.50	9.00	3 70	4.50	8.
1 11-16	11 00	6 50	7.00	1.30	4 30	2.70	10.00	4.30	5.25	10
1 15-16	12 50	7.50	8.00	1.50	5.00	3 00	11.0C	5.00	6.00	11.
2 3-16	15 00	9 00	9 00	1.90	6 50	3 75	12.50	6.30	7.50	13.
2 7-16	18 00	11.00	10.00	2 25	7 50	4 50	14 00	7.30	8.75	
2 11-16	21.00	12 50	11.00	2.50	8.50	5.00	17.00	9 00	11 00	
2 15-16	24.00	14 50	12 50	2.80	9.50	5 50	21.00	10.75	13 00	
3 3-16	28 00	17.00	13.00	3 30	11 00	6.50	26 00	12 50	15.00	
3 7-16	36 00	21 50	13 50	3.80	12.50	7.50	31.00	14 00	17.00	
3 11-16	44 00	26 50	14.00	4.20	14.00	8 50	36.00	16 00	19 00	
3 15-16	53.00	32 00	14.50	4 50	15.00	9.50	41.00	18.50	22.00	
4 3-16	62 00	37.00	15 00	5.00	17 00	10.00	46.00			
4 7-16	72.00	43 00	16 00	5 60	18.00	11 00	53.00			
4 11-16	80.00	48.00	17.00	6.20	19 00	12 00	60 C0			
4 15-16	88 00	53.00	18 00	6 80	20 00	13 00	67 00			

Belt Pulleys.

FRICTION CLUTCH PULLEYS.

For use with gasoline engines, power pumps, and like machinery, friction clutch pulleys for stopping and starting independent of power, are very convenient, and in some locations a necessity. We manufacture an improved friction clutch pulley as listed suited for different locations. In ordering, give shaft diameter and width of keyway. State revolutions it is to run, and the work it is to do.

PRICES, FRICTION CLUTCH PULLEYS.

Horse Power for.	Smallest* Pulley Diameter, Inches.	Face, Inches.	Code.	Price.
6	18	6	Fac	$22.00
10	18	8	Fad	28.00
15	24	8	Faf	36.00
20	30	8	Fag	45.00
25	36	10	Fah	55.00
35	40	12	Faj	64.00

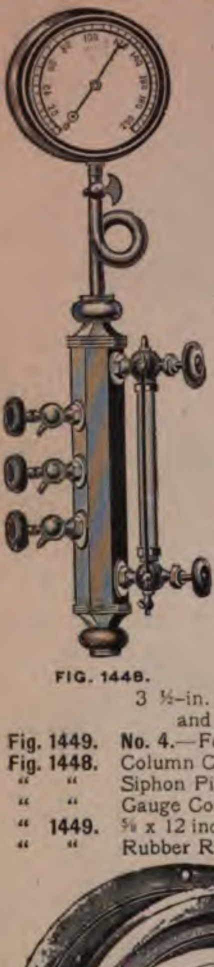
*Larger diameter of pulleys furnished for each friction at advanced price.

IRON PULLEYS.

BORED, TURNED AND BALANCED, WITH SET SCREWS OR KEY SEATS.

Diam. In.	Face in. 3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	20
6	$2 15	$2 35	$2 55	$2 80	$3 00	$3 25	$	$	$	$	$	$	$	$	$	$
7	2 25	2 50	2 75	3 00	3 25	3 50										
8	2 50	2 75	3 00	3 25	3 50	3 75	4 00	4 25								
9	2 55	2 75	3 00	3 25	3 50	3 75	4 00	4 25								
10	2 75	3 00	3 25	3 50	3 75	4 00	4 25	4 75	5 25	5 50						
11	2 85	3 10	3 30	3 60	3 90	4 25	4 50	5 00	5 25	5 75						
12	3 00	3 25	3 55	4 00	4 25	4 60	5 00	5 50	5 80	6 25	6 50	7 00				
13	3 25	3 50	3 75	4 10	4 50	5 00	5 30	5 75	6 25	6 75	7 25	7 75				
14	3 35	3 65	4 00	4 25	4 75	5 25	5 75	6 25	6 75	7 25	7 75	8 50				
15	3 45	3 85	4 20	4 55	5 00	5 65	6 10	6 70	7 25	7 75	8 25	8 75				
16	3 75	4 10	4 40	4 85	5 45	6 00	6 50	7 25	7 75	8 25	8 75	9 25	9 75			
17	3 90	4 30	4 75	5 20	5 75	6 35	6 85	7 80	8 00	8 50	9 00	9 75	10 50			
18	4 00	4 45	4 85	5 50	6 00	6 65	7 25	7 90	8 50	9 20	9 75	10 25	10 75			
20	4 50	5 25	5 75	6 50	7 00	7 50	8 00	8 75	9 25	10 00	10 75	11 50	12 25			
22	5 00	5 75	6 25	7 00	7 75	8 50	9 50	10 50	11 25	12 00	12 75	13 50	14 50			
24	5 50	6 00	6 75	7 50	8 50	9 50	10 25	11 00	11 75	12 50	13 25	14 25	15 25	16 25		
26	6 50	7 00	7 50	8 25	9 00	10 00	11 50	12 50	13 25	14 25	15 00	15 75	16 50	17 50		
28	7 50	8 00	8 50	9 50	11 50	11 50	12 50	14 25	15 25	16 25	17 00	18 00	19 00	20 00		
30	9 00	9 50	10 50	11 50	12 50	13 50	14 50	15 50	16 50	17 50	18 75	20 00	22 00	23 50		
32	....	10 50	11 25	12 25	13 25	14 50	15 50	16 50	17 50	18 50	20 25	22 00	23 50	25 00		
34	....	11 25	12 00	13 00	14 25	15 50	16 75	18 00	19 20	20 50	22 50	24 25	26 50	28 50		
36	....	12 00	12 75	13 75	15 00	16 25	17 50	19 00	20 50	22 00	24 00	25 75	28 00	30 25	35 25	40 75
38	....	13 00	14 50	15 50	17 00	18 25	20 00	21 50	23 00	24 75	27 00	29 25	31 50	33 50	37 50	42 00
40	....	....	....	17 00	18 00	19 25	21 00	22 50	25 25	27 00	29 25	31 75	33 50	35 25	39 50	43 50
42	....	....	....	18 00	19 50	21 00	22 75	24 50	26 50	28 75	31 25	33 50	36 50	39 50	44 00	48 50
44	....	....	....	19 00	21 00	22 25	24 50	26 50	28 75	31 00	33 75	35 75	38 25	40 75	45 75	51 00
46	....	....	....	20 00	21 75	23 25	25 75	28 00	30 50	33 25	36 25	39 00	42 25	45 25	50 00	55 00
48	....	....	....	21 00	23 00	24 75	27 50	30 00	33 00	35 75	38 50	42 00	44 00	46 75	52 25	60 00
54	....	....	....	27 00	31 00	34 00	36 00	38 00	41 00	43 00	46 50	51 50	54 50	57 50	68 00	77 50
60	....	....	....	33 00	36 50	40 00	43 00	46 00	50 00	54 00	59 00	63 00	68 00	72 00	80 00	90 00

Water Column and Gauge Combination



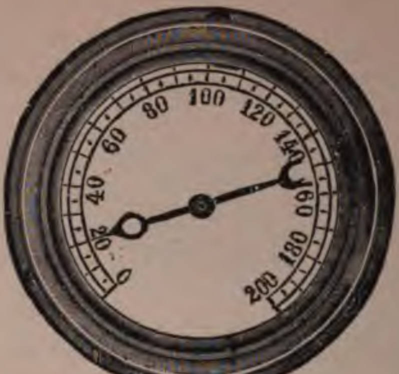


FIG. 1450.

PRICES FIG. 1450 PRESSURE GAUGE.

Diameter in inches	5	8½
Price with Iron Case and Brass Ring	$ 8.00	$22.00

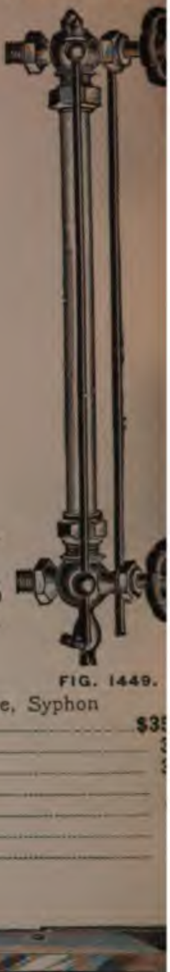


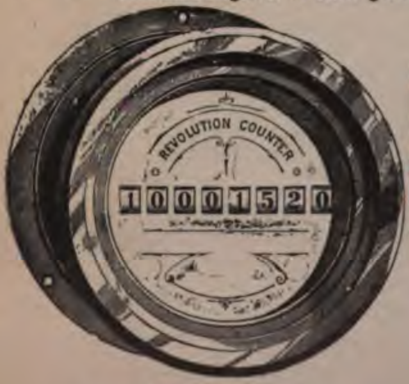
FIG. 1448.

FIG. 1449.

FIG. 1448. NO. 2.—FITTED AS FOLLOWS:

3 ½-in. Gauge Cocks; 1 each, finished Water Gauge, Steam Gauge, Syphon and 14 in. Column $35

Fig. 1449. No. 4.—For ½ or ¾ I. P., Iron Wheels, ⅝ x 12 glass, 2 rods, each 3
Fig. 1448. Column Casting only for 12 inch glass 3
" " Siphon Pipe only
" " Gauge Cocks only with ½ inch pipe thread, each
" **1449.** ⅝ x 12 inch Glass only
" " Rubber Rings for ⅝ inch glasses only



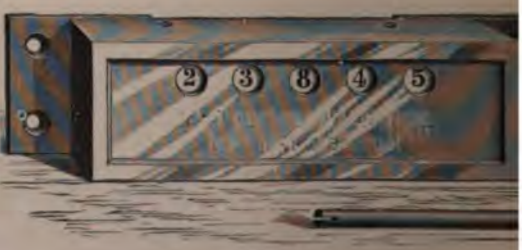


FIG. 1467.

FIG. 1466.

PRICES AND DIMENSIONS OF REVOLUTION COUNTERS. FIGS. 1466 AND 1467.

Size, Fig. 1466, inches with 8 numbers	8½	6
Price Fig. 1466, Brass Case, each	$70.00	$60,
Size **Fig. 1467** Numbers in each	5 x 1¾ 5	5½ x 6
Price Fig. 1467, each	$16.00	$31,

Boiler and Jetting Pump Trimmings.

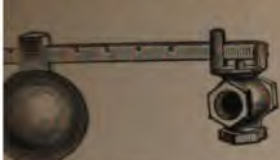


Fig. 1458.
Safety Valve.

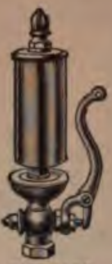


Fig. 1163.

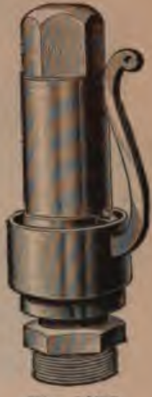


Fig. 1457.
Pop Safety.

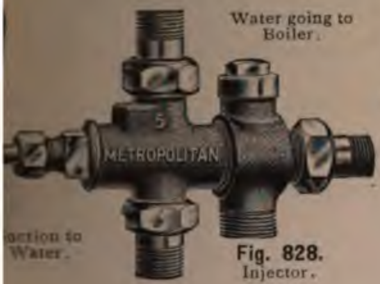

Water going to Boiler.
METROPOLITAN
5
ction to Water.

Fig. 828.
Injector.

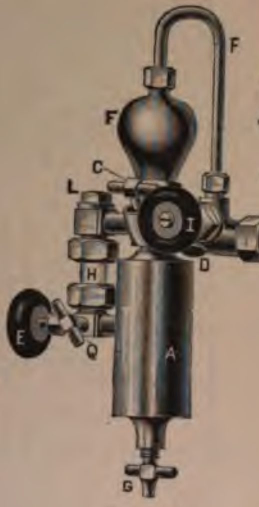


Fig. 1603.

PRICES METROPOLITAN INJECTOR, FIG. 828.

er	2	3	3½	4	5	6	7	8	9	10	11	12
il pipe connections	⅜	⅜	½	½	¾	¾	1	1	1¼	1¼	1½	1½
Supplies, H. P.	4-6	6-8	8-15	15-20	20-30	30-45	45-65	65-80	80-100	100-130	130-170	170-230
, Fig. 828	$15.	$16.	$18.	$20.	$25.	$30	$40	$45.	$55.	$60.	$75.	$90.

PRICES FIGS. 1457 AND 1458 SAFETY VALVES.

crew to . . . . Inches	1	1¼	1½	2	2½	3	3½	4
457, Pop Safety	$12.00	$15.00	$20.00	$. . . .	$. . . .	$. . . .	$. . . .	$. . . .
458, Brass	4.70	7.15	9.00	12.50				
458, Iron	4.00	5.00	5.80	7.80	13.25	17.25	23.00	28.75

PRICES WHISTLE, FIG. 1163.

bell Fig. 1163	1½	2	2½	3
screw to . . . . . . In.	⅜	¾	¾	¾
Fig. 1163	$4.00	$5.50	$6.50	$8.50

Prices. Detroit Steam Cylinder Lubricator. Fig. 1603.

Size in pints	¼	⅓	½	1
Cyl. for, inches	5	5-8	8-12	12-20
Fig. 1603, Single Con.	$15.	$17.	$20.	$. . . .
" 1603 Double Con.	15.	17.	20.	$28.

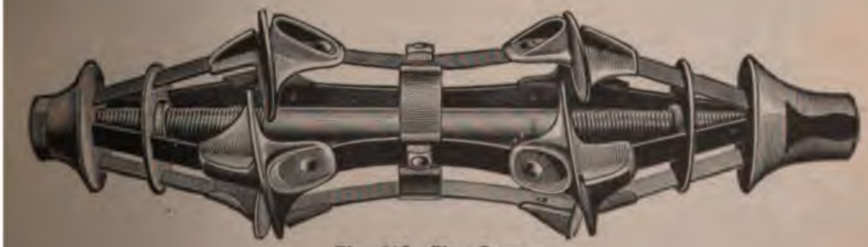


Fig. 913. Flue Scraper.

ize Flues in inches	2	2¼	2½	2¾	3
Fig 913	$2.00	$2.25	$2.50	$2.75	$3.00

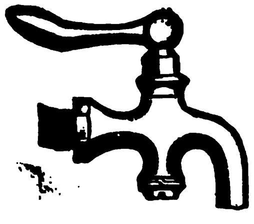


Fig. 1101.

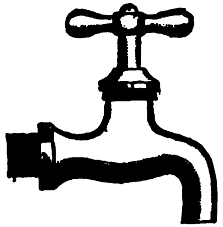


Fig. 1102.

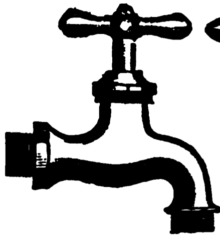


Fig. 1103.

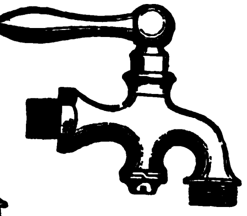


Fig. 1104.

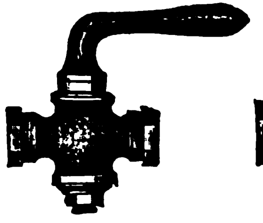


Fig. 1105.

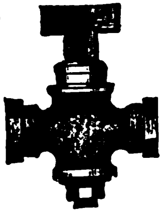


Fig. 1106.

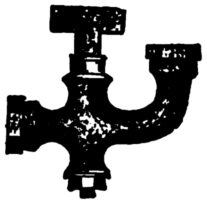


Fig. 1107.

Iron Pipe size in Inches.	**Rough, per dozen. Fig. 1101.**	Finished per dozen, Fig. 1101.	Compression, Rough, per dozen. Fig. 1102.	Compression, Finished, per dozen. Fig. 1102.	Compression, Rough, for Hose, per dozen. Fig. 1103.	Compression, Finished for Hose, per dozen, Fig. 1103.	Rough, for Hose, per dozen. Fig. 1104.	Finished, for Hose, per dozen. Fig. 1104.	Stop Cock, per dozen, N. & W. Fig. 1105	Stop Cock, plain Check, and W, N. and W., per dozen. Fig. 1105.	Stop Cock, plain. N. & W., per doz. Fig. 1106.	Stop Cock, Plain, C. & W. N. & W. per dozen. Fig. 1106.	Hydrant Cock, N. & W. per dozen. Fig. 1107.	Hydrant Cock C. & W., N. & W. per dozen. Fig. 1107.
⅜	$12 00	$13 00	$ 9 50	$ 10 00					$ 10 00	$ 11 00	$ 10 00	$ 11 00		
½	15 00	16 00	10 50	11 00	$ 11 50	$ 12 00	$ 16 00	$ 17 00	13 00	14 00	13 00	14 00	$ 15 00	$ 19 00
⅝	17 00	19 00	12 00	13 00	13 00	14 00	18 00	20 00	17 00	18 00	17 00	18 00		
¾	23 00	26 00	19 00	20 00	21 00	22 00	25 00	28 00	21 00	22 50	21 00	22 50	23 00	28 50
1	35 00	39 00	33 00	37 00	36 00	40 00	38 00	42 00	31 00	33 00	31 00	33 00	36 00	49 00
1¼	56 00	64 00	48 00	56 00	52 00	60 00	60 00	68 00	50 00	53 00	50 00	53 00	60 00	
½	78 00	90 00	74 00	86 00	78 00	92 00	84 00	96 00	70 00	74 00	70 00	74 00		

Gate, Butterfly, Globe and Angle Valves.

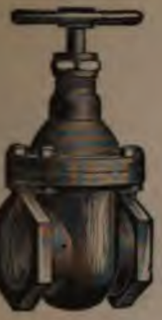


FIG. 1460.
RASS AND IRON BODY GATE VALVE.

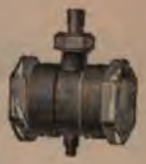


FIG. 1086.
BUTTERFLY VALVE.

PRICE OF FIGS. 1460 AND 1086 GATE AND BUTTERFLY VALVES.

of pipe threaded for,	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8
1460, Gate Valve, Brass **S. E.**	$2.50	$3.50	$5.00	$ 7.50	$	$	$	$	$	$	$	$	$
1460, Gate Valve, Iron Body **S. E.**				10.00	12.00	15.00	18.00	20.00	23.00	25.00	30.00	45.00	55.00
1086, Butterfly Valve, Steam Metal, **S. E.**	4.40	5.65	6.75	10.00									
1086, Butterfly Valve, Iron Body, **S. E.**		6.35	7.00	8.00									

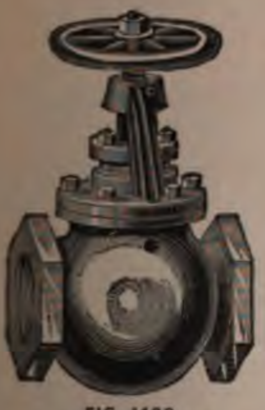


FIG. 1462.
GLOBE VALVE.

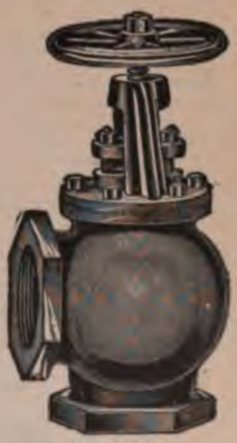


FIG. 1463.
ANGLE VALVE.

RICE OF FIG 1462 OR 1463, IRON BODY GLOBE AND ANGLE VALVES.

of pipe threaded for,	2	2½	3	3½	4	4½	5	6	7	8	10	12
1462 or 1463, Standard, no Yoke, S. E.	$5.40	$ 7.35	$ 9.80	$	$	$	$	$	$	$	$	$
1462 or 1463, Standard, with Yoke, S. E.	7.00	9.00	12.50	15.25	19.00	21.00	27.00	37.50	63.00	72.00	114.00	170.00
1462, Jenkins Disc., no Yoke S. E.	7.25	11.00	16.00									
1462, Jenkins Disc., with Yoke, S. E.		12.00	16.75	19.50	24.00	36.00	40.00	48.00	80.00	90.00	130.00	185.00

Brass Valves, Cocks, Relief Valve.

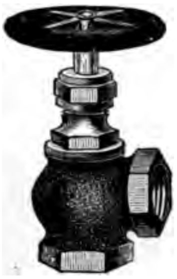


Fig. 84.
Angle Valve

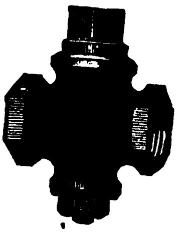


Fig. 88.
Steam Cock.

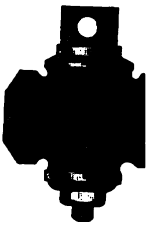


Fig. 90.
Gas Service.

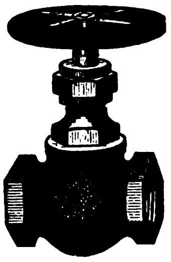


Fig. 83.
Globe Valve

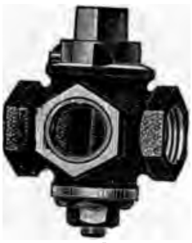


Fig. 89.
3 Way Cock.

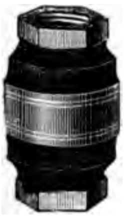


Fig. 87.
V. Check Valve.

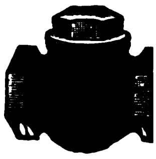


Fig. 86.
Horiz. Ck. Valv

Size Pipe Screws to........ .....Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	
Fig. 83 or **84** Brass, Standard..........	$ .72	$ .77	$1.00	$1.26	$1.80	$2.52	$3.50	$5.30	$10 00	$14.40	$26.50	$3
" or " " Ex. Heavy	1.25	1.45	1.85	2.50	3.50	5.25	7.00	10 50	20 00	27.00	50.00	6
" or " " Jenkins	1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.00	15.75	22.00	......	.
Jenkins Discs. only....................	.03	.04	.04	.05	.06	.09	.12	.18	.24	.33	......	..
Fig. 86 Brass....................... ...	.65	.70	.90	1.15	1.60	2.25	3.15	4.75	9.00	13.00	24.00	3
" **87** "	.72	.77	1.00	1.26	1.80	2.52	3.50	5 30	10.00	14.40	26.50	3
" **88** "	.85	1.00	1.25	1.70	2.35	3.70	4.85	7.30	14 50	22.50	38.50	5
" **89** "	......	......	2.50	3.00	3.75	5.75	7.15	11.00				
" **89** Iron	......	.85	.90	1.05	1.30	1.60	1.95	2.70				
" **89** I. B., Brass Plug	......	......	2.20	2.40	3.10	4.50	6.25	9.75				
" **90** Brass............	.75	.85.	.95	1.15	1.50	2 25	3.10	5.00				

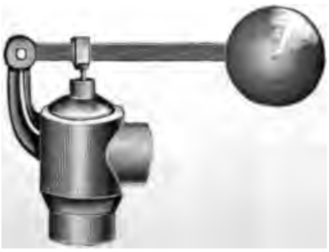


Fig. 131.

Fig. 131 Iron Water Relief Valve is used on Jett Pump discharge Pipe to prevent bursting of hose in case sudden stoppage of water discharge from drill attached lower end of drill rods in well.

Prices with **1** inch Connection............................ ....**$4.**
" " **1¼** " " .... **5.**

Wrought Nipples.

PLAIN RIGHT HAND.

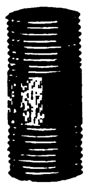


FIG. 1120.

	Length Close.	Length Short.	Length Long.	Size, Inches.	Close or Short	Long.	PRICES OF EXTRA LONG NIPPLES. Length in Inches.							
							4	5	6	7	8	9	10	12
BLACK.	1⅛	1½	2 to 3½	⅛ ¼ ⅜	$ .04	$ .06	$ .07	$ .08	$0.10	$0.12	$0.14	$0.15	$0.17	$0.19
	1⅛	1½	2 " 3½	½	.05	.07	.08	.10	.12	.14	.16	.18	.20	.23
	1⅜	2	2½ " 4	¾	.06	.09	....	.11	.13	.17	.18	.20	.22	.26
	1½	2	2½ " 4	1	.08	.13	....	.15	.18	.23	.25	.28	.31	.36
	1⅝	2½	3 " 4½	1¼	.11	.17	....	.20	.24	.29	.33	.36	.40	.47
	1¾	2½	3 " 4½	1½	.13	.20	....	.25	.29	.36	.40	.45	.50	.59
	2	2½	3 " 4½	2	.18	.27	....	.32	.38	.50	.54	.59	.65	.77
	2½	3	3½ " 5	2½	.39	.59	....	....	.68	.90	.97	1.06	1.17	1.35
	2½	3	3½ " 5	3	.48	.72	....	....	.85	1.08	1.20	1.33	1.45	1.70
	2¾	4	4½ " 6	3½	.75	1.05	....	....	....	1.30	1.45	1.60	1.75	2.05
	3	4	4½ " 6	4	.85	1.20	....	....	....	1.52	1.69	1.87	2.05	2.40
	3	4	4½ " 6	4½	1.25	1.70	....	....	....	2.25	2.50	2.75	2.95	3.40
	3½	4½	5 " 6½	5	1.55	2.45	....	....	....	2.53	2.83	3.10	3.35	3.85
	3½	4½	5 " 6½	6	1.85	2.90	....	....	....	3.05	3.35	3.70	4.00	4.65
	4	5	6	7	3.20	3.60	....	....	....	4.05	4.45	4.90	5.30	6.15
	4	5	6	8	3.55	4.05	....	....	....	4.55	5.05	5.50	6.00	7.00
	5	6	8	9	5.25	6.50	....	....	....	....	....	7.10	7.75	9.00
	5	6	8	10	6.75	8.25	....	....	....	....	....	8.90	9.70	11.15
	5	6	8	12	8.00	10.00	....	....	....	....	....	10.80	11.75	13.65
GALVANIZED.	⅞	1½	2 to 3½	¼	$ .06	$ .11	$ .12	$ .15	$ .17	$ .21	$ .24	$ .26	$ .29	$ .34
	1	1½	2 " 3½	⅜	.06	.11	.12	.15	.17	.21	.24	.26	.29	.34
	1⅛	1½	2 " 3½	½	.06	.11	.13	.16	.18	.23	.26	.28	.31	.36
	1⅜	2	2½ " 4	¾	.08	.14	....	.18	.21	.26	.29	.32	.35	.41
	1½	2	2½ " 4	1	.11	.19	....	.24	.28	.34	.38	.42	.47	.55
	1⅝	2½	3 " 4½	1¼	.17	.29	....	.32	.38	.45	.51	.57	.63	.75
	1¾	2½	3 " 4½	1½	.21	.35	....	.39	.46	.55	.63	.70	.77	.91
	2	2½	3 " 4½	2	.27	.47	....	.52	.61	.74	.83	.93	1.03	1.23
	2½	3	3½ " 5	2½	.56	.86	....	....	1.00	1.26	1.41	1.56	1.71	2.01
	2½	3	3½ " 5	3	.70	1.10	....	....	1.30	1.60	1.80	2.00	2.20	2.60
	2¾	4	4½ " 6	3½	1.20	1.70	....	....	....	2.10	2.35	2.60	2.85	3.40
	3	4	4½ " 6	4	1.35	1.87	....	....	....	2.30	2.60	2.90	3.20	3.80
	3	4	4½ " 6	4½	1.85	2.60	....	....	....	3.30	3.65	4.05	4.45	5.25
	3½	4½	5 " 6½	5	2.30	3.15	....	....	....	3.75	4.20	4.60	5.00	5.85
	3½	4½	5 " 6½	6	2.80	4.25	....	....	....	4.50	5.00	5.55	6.05	7.15

X Nipple **Twice** and **XX** Nipples **Four Times** list of Standard Black. R. & L. Nipples **60 per cent.** above Standard.

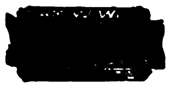


Fig. 1116.

Fig. 1117.

Fig. 1118.

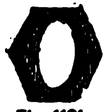


Fig. 1121.

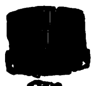


Fig. 1122.

SIZE OF FITTINGS	1/8	1/4	3/8	1/2	3/4	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Couplings, Mall.—Black **R. & L.**	....	.04	.05	.08	.12	.16	.25	.36	.52	....	....	....	....	....	....	....	....	....	....	....	....
“ **Wrought**—I. Patent Sleeve **R. H.**	....	....	....	.10	.12	.15	.25	.30	.40	.60	.80	1.30	1.50	2.00	2.40	2.80	3.85	4.00	5.00	6.00	....
“ “ —Standard Black **R. H.**	.05	.05	.06	.07	.10	.13	.17	.21	.28	.40	.60	.80	1.00	1.50	1.65	2.40	3.25	4.25	5.50	7.50	10.00
“ “ — “ Galv. **R. H.**	.06	.06	.08	.10	.13	.18	.25	.32	.40	.55	.80	1.05	1.40	2.00	2.25	3.25	....	....	....	....	....
“ “ —X Heavy Black **R. H.**	....	....	....	....	.25	.30	.50	.60	.80	1.20	1.60	2.60	3.00	4.00	4.80	5.60	7.70	8.00	10.00	12.00	16.00
“ “ —XX “ “ **R. H.**	....	....	....	....	.48	.60	1.00	1.20	1.60	2.40	3.20	5.20	6.00	8.00	9.60	11.20	15.40	16.00	20.00	24.00	32.00
“ **Brass**—Rough **R. H.** [Finished are Double Rough.]	.10	.14	.16	.25	.37	.50	.60	.90	1.35	2.40	3.50	....	....	....	....	....	....	....	....	....	....
Unions, Malleable—Black	....	.18	.20	.22	.27	.33	.46	.58	.75	1.55	2.10	3.65	4.35	....	....	....	....	....	....	....	....
“ “ —Galv	....	.27	.30	.33	.40	.50	.70	.90	1.15	2.35	3.15	5.50	6.50	....	....	....	....	....	....	....	....
“ **C. I.**, Flanged, Bolted	....	....	....	.40	.46	.52	.64	.78	1.00	1.25	1.50	1.80	2.10	2.70	3.15	3.95	5.50	7.00	10.00	11.50	16.00
“ “ “ Very Heavy Turned	....	....	....	.80	.92	1.05	1.28	1.56	2.00	2.50	3.00	3.60	4.20	5.40	6.30	7.90	11.00	14.00	20.00	23.00	32.00
“ **Brass Ground Jt.**—Rough [Finished are Double Rough.]	.35	.40	.55	.75	1.00	1.40	1.90	2.75	4.00	6.50	8.50	....	....	....	....	....	....	....	....	....	....
Lock Nuts, Malleable—Black	....	.02	.03	.04	.05	.07	.09	.11	.18	.40	.50	....	....	....	....	....	....	....	....	....	....
“ “ **C. I.**	....	....	....	....	....	....	....	....	.25	.27	.34	.47	.64	.85	.90	1.30	1.70	2.35	2.70	3.00	4.00
“ “ **Brass** [Finished are Double Rough.]	....	.10	.12	.15	.20	.30	.45	.70	.95	1.50	2.75	...	....	....	....	....	....	....	....	....	....
Caps, Malleable—Black	....	.03	.04	.05	.08	.12	.16	.24	.32	.45	.85	1.00	1.20	....	....	....	....	....	....	....	....
“ **C. I.**—Black	....	....	....	....	....	....	....	....	.26	.40	.54	.75	.87	1.05	1.20	1.55	2.50	2.85	4.75	5.50	7.00
“ “ —Very Heavy	....	....	....	....	....	....	....	....	.52	.80	1.08	1.50	1.75	2.10	2.40	3.10	5.00	5.70	9.50	11.00	14.00
“ **Brass**—Rough [Finished are Double Rough.]	.15	.15	.20	.25	.35	.45	.60	.80	1.10	2.00	3.00	....	....	....	....	....	....	....	....	....	....
Plugs, C. I.—Black	....	.02	.02	.02	.03	.04	.05	.07	.10	.18	.25	.38	.42	.65	.88	1.20	1.85	2.75	3.25	3.75	5.00
“ “ —Galv	....	.04	.04	.04	.06	.08	.10	.14	.20	.36	.50	.76	.84	1.30	1.75	2.40	3.70	5.50	6.50	7.50	10.00
Return Bends, Mall.—C. Pat. **R. H.**	...	....	....	.13	.25	.35	.50	.75	1.00	..	....	....	....	....	....	....	....	....	....	....	....
“ “ “ “				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]												

Fig. 1109.

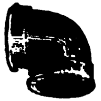


Fig. 1108.

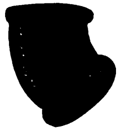


Fig. 1110.

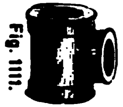


Fig. 1111.

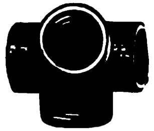


Fig. 1112.

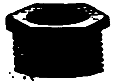


Fig. 1114.

Fig. 1116.

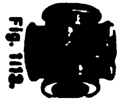


Fig. 1113.

s, Malleable Iron Black	.01	.04	.06	.10	.15	.22	.25	.35	.50	.80	1.50	2.25	3.00								
" " " Gal		.05	.08	.14	.20	.32	.40	.60	.90	1.35	2.00	3.75	5.00								
" " " —Black Street			.10	.12	.20	.25	.40	.55	.90												
" " " - Gal. "			.12	.15	.28	.35	.55	.80	1.30												
" " " —Black Drop		.06	.08	.12	.20	.25															
" " " -Gal. "			.12	.20	.35	.40															
" " " -Black Side O.			.08	.10	.18	.30	.45	.60													
" " " —Black R. & L.		.05	.06	.08	.12	.20	.28	.40	.65												
" **Cast Iron**—Black		.05	.05	.06	.08	10½	.16	.20	.28	.50	.75	1.05	1.20	1.75	2.00	2.75	4.70	6.75	9.00	13.50	20.00
" " " —Gal		.10	.10	.12	.16	.21	.32	.40	.56	1.00	1.50	2.10	2.40	3.50	4.00	5.50	9.40	13.50	18.00	27.00	40.00
" " " —Black—Red			.06	.07	.09	.12	.18	.23	.32	.60	.85	1.20	1.40	2.00	2.30	3.15	5.40	7.75	10.50	15.50	23.00
" " " — " 45°		.06	.06	.07	.10	.12	.19	.24	.31	.60	.90	1.25	1.45	2.20	2.50	3.45	5.90	8.50	11.25	17.00	25.00
" " " — " R. & L.		.06	.06	.07	.09	.12	.18	.23	.32	.60	.85										
" " " — " Extra Heavy											1.00	1.40	1.75	2.25	2.70	3.60	6.30	9.00	12.00	17.00	27.00
Brass Rough [Finished are Double Rough.]	.12	.17	.21	.28	.35	.50	.85	1.10	1.50	3.50	4.50	7.00	10.00								
Tees, Malleable Iron—Black	.07	.07	.08	.11	.15	.25	.30	.45	.60	1.05	1.70	2.50	3.40								
" " " Gal			.10	.16	.20	.38	.50	.70	1.00	1.90	3.00	4.25	5.75								
" " " —4 Way Blk			.12	.14	.20	.35	50	.80													
" " " —Drop		.06	.10	.14	.22	.30															
" **Cast Iron**—Black		.08	.08	.09	.12	.15	.23	.29	.41	.73	1.10	1.50	1.75	2.55	3.00	4.00	6.80	9.75	13.00	19.50	29.00
" " " Gal		.16	.16	.18	.24	.30	.46	.58	.82	1.46	2.20	3.00	3.50	5.10	6.00	8.00	13.60	19.50	26.00	39.00	58.00
" " " Blk. -Red			.09	.10	.14	.17	.27	.33	.47	.83	1.25	1.75	2.00	2.95	3.50	4.60	7.80	11.25	15.00	22.50	33.50
" " " —Extra Heavy													2.30	3.20	4.25	5.50	9.00	13.00	18.00	26.00	38.00
" **Brass** Rough [Finished are Double Rough.]	.15	.20	.30	.40	.50	.75	1.00	1.30	1.75	4.00	5.50	9.00	13.00								
Bushings, Mall. Iron—Black			.05	.06	.07	.09	.13	.17	.27	.42											
" " " —Gal			.06	.07	.10	.14	.21	.30	.44	.59											
" **Cast Iron**—Black			.04	.04	.05	.06	.07	.09	.14	.21	.30	.40	.50	.75	.93	1.25	1.87	2.75	3.25	3.75	5.00
" " " —X Heavy													.65	1.00	1.25	1.60	2.25	3.50	4.25	5.00	6.25
" **Brass**—Rough [Finished are Double Rough.]		.10	.12	.14	.21	.38	.50	.67	1.00	1.50	2.50										
Reducers, Mall. Iron—Black		.03	.03	.05	.10	.16	.20	.28	.45	.70	1.00	1.50	1.85								
" " " —Gal				.08	.15	.25	.35	.45	.75	1.05	1.65	2.40	3.05								
" **Cast Iron**—Black									.43	.60	.80	1.00	1.35	1.85	2.00	2.70	5.35	6.75	8.35	10.00	15.00
" **Brass**—Rough [Finished are Double Rough.]		.16	.22	.32	.45	.65	.90	1.12	1.85	3.00	4.50										
Crosses, Mall. Iron—Black		.08	.10	.12	.20	.30	.40	.60	1.00	1.75	3.00	3.25	5.25								
" " " —Gal				.17	.25	.45	.60	.90	1.50	2.75											
" **Cast Iron**- Black			.15	.16	.22	.27	.42	.53	.75	1.30	2.00	2.70	3.15	4.60	5.50	7.25	12.25	17.50	23.50	35.00	52.50
" " " Gal			.30	.32	.44	.54	.84	1.06	1.50	2.60	4.00	5.40	6.30	9.20	11.00	14.50	24.50	35.00	47.00	70.00	105.00
" " " —B. Red				.18	.25	.30	.46	.60	.83	1.45	2.20	3.00	3.50	5.10	6.00	8.00	13.50	19·25	26.00	38.50	58.00
" " " —Ex. Heavy											2.70	3.60	4.30	6.00	7.00	10.00	15.00	22.00	30.00	43.00	65.00

Steam, Gas and Water Pipe.

Adopted February 22, 1899.

Nominal Inside Diam.	Actual Outside Diam.	Price per ft. Black.	Price per ft. Galv.	Nominal weight per ft.	Nominal Outside Diam. Standard Couplings.
INCHES				POUNDS	
⅛	.405	$ .08½	$ .18	.24	.562
¼	.54	.08½	.16	.42	.718
⅜	.675	.08½	.16	.56	.875
½	.84	.10½	.17	.84	1.000
¾	1.05	.11½	.19	1.12	1.312
1	1.315	.16½	.26	1.67	1.625
1¼	1.66	.22	.36	2.24	1.937
1½	1.9	.27	.44	2.68	2.125
2	2.375	.36	.59	3.61	2.750
2½	2.875	.57	.91	5.74	3.250
3	3.5	.75	1.20	7.54	3.812
3½	4.	.93	1.60	9.00	4.375
4	4.5	1.07	1.75	10.66	4.937
4½	5	1.40	2.30	12.49	5.406
5	5.563	1.55	2.55	14.50	6.031
6	6.625	1.95	3.20	18.76	7.406
7	7.625	2.53	4.30	23.27	8.250
8	8.625	2.95	5.20	28.18	9.187
9	9.625	3.80		33.70	10.50
10	10.75	4.50		40.00	11.68
11	12	5.30		45.00	12.12
12	12.75	5.75		49.00	13.87
13	14.	6.50		54.00	15.50
14	15.	7.25		58.00	16.37
15	16.	7.50		62.00	17.68

We sell **Plugged** and **Reamed** Pipe, **Standard Drive** Pipe, and **Patent Socket Drive Pipe, all especially fitted for well sinking.**

Artesian, Salt, and Oil Well Casing.

Screw and Socket, or Inserted Joint.
Adopted February 22. 1899.

Nominal Inside diameter	Price per foot.	Actual outside Diam.	Nominal Wt. per ft. lbs.	threads per In.
2	$ .28	2¼	2.22	14
2¼	.30	2½	2.82	14
2½	.32	2¾	3.13	14
2¾	.34	3	3.45	14
3	.37	3¼	4.10	14
3¼	.40	3½	4.45	14
3½	.43	3¾	4.78	14
3¾	.49	4	5.56	14
4	.54	4¼	6.00	14
4¼	.56	4½	6.36	14
4½	.58	4¾	6.73	14
4¾	.63	5	7.80	14
5	.65	5¼	8.20	14
5 3-16	.67	5½	8.62	14
5⅝	.76	6	10.46	14
6¼	.91	6⅝	11.58	14
6⅝	1.00	7	12.34	14
7¼	1.07	7⅝	13.55	14
7⅝	1.30	8	15.41	11½
8¼	1.43	8⅝	16.07	11½
8⅝	1.60	9	17.60	11½
9⅝	1.90	10	21.90	11½

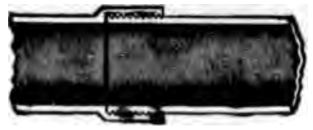


Figure 834 represents Inserted Joint Casing.

PRICE LIST X AND XX STRONG PIPE.

Adopted February 22. 1899. Not threaded.

Size.	Price per ft.	Actual Outside Diam.	Nominal Inside Diam.	Thickness.	Nominal weight per ft.
X STR'G					
½	$ .19	.840	.512	.149	1.09
¾	.20	1.05	.736	.157	1.39
1	.29	1.315	.951	.182	2.17
1¼	.39	1.66	1.272	.194	3.00
1½	.48	1.900	1.494	.203	3.63
2	.63	2.375	1.933	.221	5.02
2½	1.15	2.875	2.315	.280	7.67
3	1.50	3.500	2.892	.304	10.25
3½	1.90	4.000	3.358	.321	12.47
4	2.15	4.500	3.818	.341	11.97
4½	2.80	5.000	4.280	.360	18.22
5	3.10	5.563	4.813	.375	20.51
6	3.90	6.625	5.750	.437	28.58
7	5.25	7.625	6.625	.500	37.67
8	6.00	8.625	7.625	.500	43.00
XX STRG					
½	$ .50	.81	.211	.298	1.70
¾	.60	1.05	.422	.314	2.44
1	.75	1.315	.587	.364	3.65
1¼	.85	1.66	.885	.388	5.20
1½	1.10	1.90	1.088	.406	6.40
2	1.60	2.375	1.491	.442	9.02
2½	2.30	2.875	1.755	.560	13.68
3	3.25	3.50	2.284	.608	18.56
3½	4.20	4.00	2.716	.642	22.75
4	4.85	4.50	3.136	.682	27.48
4½	6.45	5.00	3.564	.718	32.53
5	7.35	5.563	4.063	.75	38.12
6	9.15	6.625	4.875	.875	53.11
7	11.85	7.625	5.875	.875	62.38
8	13.75	8.625	6.875	.875	71.62

Threading X and XX pipe and furnishing X and XX couplings to be added.

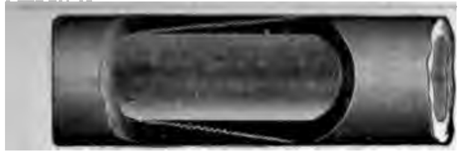


Fig. 1572.

Standard Flush Joint Well Tubing.

Size Inches	Actual Outside Diameter.	Nominal Inside Diameter.	Nominal Weight per foot.	Price Standard
2	2.375	2.067	3 609	Use kerosene on joints. Prices on application.
2½	2.875	2 468	5.739	
3	3 5	3 067	7.536	
3½	4	3 548	9.001	
4	4 5	4 026	10.665	
4½	5.	4 508	12 49	
5	5 563	5.045	14 502	
6	6.625	6 065	18 762	
7	7 625	7 023	23.271	
8	8 625	7 982	28.177	
9	9 625	8 937	33.701	
10	10.75	10 019	40.065	

It increases water from well by permitting use of larger water cylinder. It is used in well work to keep diameter of hole large.

Strongest flush joint made.

PRICE LIST

CUTTING AND THREADING STANDARD PIPE.

Size Pipe	Price for Stand. and for S. & S. Casing.	Price Drive Pipe thread	Size Pipe	Price for Stand. and for S. & S. Casing.	Price Drive Pipe thread
1	$ 06	$.12	4½	$ .45	$ .90
1¼	.07	.14	5	.55	1 10
1½	.08	.16	6	.70	1.40
2	.10	.20	7	.85	1.70
2½	.15	.30	8	1 00	2.00
3	.20	.40	9	1.25	2 50
3½	.25	.50	10	1.50	3.00
4	.35	70	12	2.50	5 00

Price for fitting Inserted Bell Ended Casings. 60 cents per hour.

Add 15 per cent. to standard list for cutting off X Pipe. and 30 per cent. extra for XX Pipe.

Price for threading or cutting Sleeve Joint Casing takes list for next larger size standard pipe.

Price List Standard Boiler Tubes.

Adopted Jan. 20, 1898. Lengths to 20 feet.

Outside Diameter. Inches.	Price per foot.	Thickness Inches.	Thickness nearest Bgm. W.G.	Nominal Weight per foot.
1	$	.095	13	.90
1¼		.095	13	1.15
1½		.095	13	1.40
1¾	.32	.095	13	1.66
2	.30	.095	13	1.91
2¼	.36	.095	13	2.16
2½	.36	.109	12	2.75
2¾		.109	12	3.04
3	.39	.109	12	3 33
3¼	.45	.120	11	3.96
3½	.48	.120	11	4.28
3¾	.55	.120	11	4.60
4	.60	.134	10	5.47
4½	.69	.134	10	6.17
5	.82	.148	9	7.58
6	1.08	.165	8	10 16
7	1.33	.165	8	11.90
8	1.70	.165	8	13 65

Approximate Weights of Flat Steel and Iron.

PER LINEAL FOOT.

Width in Inches.	Thickness in Inches.											
	1-16	⅛	3-16	¼	5-16	⅜	7-16	½	⅝	¾	⅞	1
1	.21	.43	.638	.850	1.06	1.28	1.49	1.70	2.12	2.55	2.98	....
1⅛	.24	.48	.720	.955	1.20	1.43	1.68	1.92	2.39	2.87	3.35	3.
1¼	.27	.53	.797	1.06	1.33	1.59	1.86	2.12	2.65	3.19	3.72	4.
1⅜	.30	.59	.875	1.17	1.46	1.76	2.05	2.34	2.92	3.51	4.09	4.
1½	.32	.64	.957	1.28	1.59	1.92	2.23	2.55	3.19	3.83	4.47	5.
1⅝	.35	.69	1.04	1.38	1.73	2.08	2.42	2.77	3.46	4.15	4.84	5.
1¾	.38	.75	1.11	1.49	1.86	2.23	2.60	2.98	3.72	4.47	5.20	5.
2	.43	.85	1.28	1.70	2.12	2.55	2.98	3.40	4.25	5.10	5.95	6.
2¼	.48	.96	1.44	1.91	2.39	2.87	3.35	3.83	4.78	5.75	6.69	7.
2½	.53	1.06	1.59	2.12	2.65	3.19	3.72	4.25	5.31	6.38	7.44	8.
2¾	.59	1.17	1.75	2.34	2.92	3.51	4.09	4.67	5.84	7.02	8.18	9.
3	.64	1.28	1.91	2.55	3.19	3.83	4.46	5.10	6.38	7.65	8.93	10.
3¼	.69	1.38	2.07	2.76	3.45	4.15	4.83	5.53	6.91	8.29	9.67	11.
3½	.75	1.49	2.23	2.98	3.72	4.47	5.20	5.95	7.44	8.93	10.41	11.
3¾	.80	1.60	2.39	3.19	3.99	4.78	5.58	6.38	7.97	9.57	11.16	12.
4	.85	1.70	2.55	3.40	4.25	5.10	5.95	6.80	8.50	10.20	11.90	13.
4½	.96	1.92	2.87	3.83	4.78	5.74	6.70	7.65	9.57	11.48	13.39	15.
5	1.07	2.13	3.19	4.25	5.31	6.38	7.44	8.50	10.63	12.75	14.87	17.
5½	1.17	2.34	3.51	4.67	5.84	7.02	8.18	9.35	11.69	14.03	16.36	18.
6	1.28	2.55	3.83	5.10	6.38	7.65	8.93	10.20	12.75	15.30	17.85	20.
7	1.49	2.98	4.46	5.95	7.44	8.93	10.41	11.90	14.87	17.85	20.83	23.
8	1.70	3.40	5.10	6.80	8.50	10.20	11.90	13.60	17.00	20.40	23.80	27.

Approximate Weights of Round and Square Steel.

And Round Cold Rolled Steel Shafting.

PER LINEAL FOOT,

Size in inches.	● W't. Lbs.	■ W't. Lbs.	Size in inches.	● W't. Lbs.	■ W't. Lbs.
¼	.167	.213	2⅛	12.06	15.36
5-16	.261	.332	2 3-16	12.79	....
⅜	.375	.478	2¼	13.52	17.22
7-16	.511	.651	2⅜	15.07	19.19
½	.668	.851	2 7-16	15.83	....
9-16	.845	1.076	2½	16.70	21.26
⅝	1.044	1.329	2⅝	18.41	23.44
11-16	1.25	....	2¾	20.21	25.73
¾	1.503	1.914	2 15-16	22.96	....
13-16	1.757	....	3	24.05	30.62
⅞	2.046	2.605	3 1 16	24.58	....
15-16	2.34	....	3⅛	26.09	....
1	2.672	3.402	3¼	28.23	35.94
1 1-16	3.00	....	3½	32.74	41.68
1⅛	3.382	4.306	3¾	37.57	47.84
1 3-16	3.74	....	4	42.77	54.45
1¼	4.175	5.316	4½	54.83	69.81
1 5-16	4.61	....	5	66.82	85.08
1⅜	5.052	6.432	5½	80.85	102.94
1 7-16	5.5	....	6	96.22	122.51
1½	6.012	7.655	6½	112.92	143.78
1 9-16	6.52	.. ....	7	130.97	166.75
1⅝	7.056	8.984	7½	150.34	191.42
1 11-16	7.6	....	8	171.04	217.78
1¾	8.183	10.419			
1 13-16	8.78	....			
1⅞	9.394	11.961			
1 15-16	10.	....			
2	10.69	13.61			

Number of Rivets in 100 Pounds.

LENGHTS.	⅜ In.	7-16 In.	½ In.	9-16 In.	⅝ In.	¾
¾	1,965	1,429	1,092	944	665	.
⅞	1,848	1,335	1,027	846	597	..
1	1,692	1,222	940	763	538	...
1⅛	1,512	1,092	840	726	512	..
1¼	1,437	1,036	797	691	487	
1⅜	1,368	988	760	653	460	
1½	1,300	949	730	624	440	
1⅝	1.260	924	711	596	420	
1¾	1,200	900	693	553	390	
1⅞	1,156	840	618	532	375	
2	1,100	789	608	511	360	
2⅛	1,031	744	573	502	354	
2¼	999	721	555	491	347	
2½	945	682	525	475	335	
2¾	900	650	500	443	312	
3	828	598	460	411	290	1
3¼	779	562	433	379	267	1
3½	743	536	413	352	248	1
3¾	715	513	395	341	241	1
4	....	....	.. .. ..	326	230	1
4¼	....	....	... .	312	220	1
4½	....	....	....	298	210	1
4¾	....	....	... .	284	200	1
5	....	....	... .	270	190	1
5¼	....	....	....	256	180	1
5½	....	....	....	244	172	1
6	....	.. ..	.. ....	223	157	1
6½	....	....	....	207	146	1
7	....	....	....	198	140	1

The Length of Rivets is the measure under the head.

WEIGHT OF SHEETS OF IRON AND STEEL.

(Weight in pounds per square foot.)

Thickness in inches.	Iron in Lbs.	Steel in Lbs.	Thickness in inches.	Iron in Lbs.	Steel in Lbs.
1-32	1.263	1.35	5-8	25.26	26.00
1-16	2.526	2.75	11-16	27.79	28.50
3-32	3.789	4.00	3-4	30.31	31.00
1-8	5.052	5.35	13-16	32.84	33.50
5-32	6.315	6.75	7-8	35.37	36.00
3-16	7.578	7.85	15-16	37.89	38.50
7-32	8.841	9.25	1	40.42	41.00
1-4	10.10	11.00	1 1-16	42.50	43.50
9-32	11.37	11.75	1 1-8	45.00	46.00
5-16	12.63	13.50	1 3-16	47.50	48.50
11-32	13.89	14.25	1 1-4	50.00	51.00
3-8	15.16	16.00	1 5-16	52.50	53.50
13-32	16.42	16.75	1 3-8	55.00	56.10
7-16	17.68	18.50	1 7-16	57.50	58.65
15-32	18.95	19.25	1 1-2	60.63	61.20
1-2	20.21	21.00	1 3-4	70.73	71.40
9-16	22.73	23.50	1 7-8	75.00	76.50
			2	80.83	81.60

Approximate Weight of Lumber Board Measure, Lbs. per 1000 Ft.

Pine, White	Green	2790
" "	Dry	1860
" Southern	Green	5020
" "	Dry	3340
Oak,	Green	4800
"	Dry	3200
Hickory,	Green	5960
"	Dry	3940
Ash,	Green	4240
"	Dry	2830
Maple,	Green	4900
"	Dry	3270

Boiler and Engine Information.

In calculating **horse-powers** of steam **boilers**, consider for:

Tubular Boilers, 15 square feet of heating surface, equvilant to 1 horse-power.
Portable Boilers, 12 square feet of heating surface, equivalent to 1 horsepower.
Cylinder Boilers, 10 square feet of heating surface, " " " "

Best designed boilers, well set, with good draft and skillful firing, will evaporate from 7 to 10 pounds of water per pound of first-class coal. The average result is from 30 to 60 per cent. below this.

It is safe to assume that 2¼ lbs of dry wood is equal to 1 lb. average quality of soft coal, and that the full value of the same weight of different woods is very nearly the same

A cubic inch of water evaporated under ordinary atmospheric pressure is converted into 1 cubic foot of steam (approximately.)

Steam at atmospheric pressure flows into the atmosphere at the rate of 650 ft. per second.

1 square foot foot of grate will consume on an average 12 pounds of coal per hour

Steam Engines, in economy, vary from 20 to 60 lbs. of feed water and from 2 to 7 lbs of coal per hour per indicated H. P.

To determine the **horse-power** of a **steam engine**, multiply the area of the piston in square inches by the average force of steam in pounds, and by the velocity of the piston in feet per minute; divide the product by 33,000 and 7-10 of the quotient will equal the **effective** power.

Or square the diameter of the cylinder in inches, multiply that by the velocity in feet per minute;divide by1000; that gives the horse power at 60 lbs. steam pressure in cylinder

PNEUMATIC INFORMATION.

As air is compressed, it rises in temperature. The temperature to which it finally attains depends upon the initial temperature before being compressed and also upon the degree of compression. The extent of this heating is shown in the following table. Supposing the air to be compressed is dry.

Temperature of Steam Under Different Pressures.

Lbs. Peressure........	1	10	14.7	20	30	40	50	60	70	80	90	100	110	120	130	140	150	175	200
Tmperature in Vacuum.	102.1	193.3	212	228	250.4	267.3	281	292.7	302.9	312	320.2	327.9	334.6	341.1	347.2	350.9	358.3	370.8	381.7

Temperature of Air when Compressed to No. of Pounds.

No. of Lbs. of Compressed Air........	0	15	30	45	60	75	90	105	120
Temperature of Air....................	60°	177°	255°	319°	369°	416°	455°	490°	524°
" " "	90°	212°	294°	362°	417°	465°	507°	545°	580°

The above table shows the air when compressed. If in the Southern states, it would be well to calculate on initial temperature of 90 degrees for free air. North or south of latitude 45 degrees, calculate on 60 degrees. By comparing it with the steam pressure and the heat steam is at the various pressures, a comparison can be made of the excessive heat that air attains.

Loss of Pressure from Friction of Compressed Air in Pipe.

DIAM. PIPE IN.	Cubic Feet Free Air Compressed to a Gauge Pressure of 60 lbs. and Passing Through the Pipe Each Minute.																	
	50	75	100	125	150	200	250	300	400	600	800	1000	1200	1500	1800	2000	2500	3000
	Pressure Loss in lbs. per sq. in. for each 1000 Feet of Straight Pipe.																	
1	10.40																	
1¼	2.60	5.90																
1½	1.20	2.75	4.90	7.65	11.													
2	.35	.80	1.40	2.20	3.20	5.65	8.80											
2½	.15	.30	.60	.90	1.30	2.30	3.60	5.20	9.20									
3		.10	.20	.30	.45	.80	1.25	1.80	3.15	7.00								
3½				.15	.20	.40	.60	.85	1.50	3.40	6.00							
4						.20	.30	.45	.80	1.80	3.20	5.00	7.25	11.30				
5							.10	.15	.25	.60	1.05	1.65	2.35	3.65	5.30	6.50	10.20	
6										.25	.40	.65	.95	1.45	2.10	2.60	4.05	5.80
8											.10	.15	.25	.35	.55	.65	1.00	1.50
10														.10	.15	.20	.35	.50

Air Friction and Temperature Tables.

This table gives the **pressure** required at sea level to force the approx. given number of gallons of water per minute through **1,000 ft.** of straight pipe on a level; elbows and bends add more resistance. The pressure required will be in proportion to distance; to increase the delivery, increase the pressure. Add to this table one-half pound for each foot rise:

Inside Diameter of Pipe in inches	3	3½	4	4½	5	6	7	8	9	10	12	14	15
Loss Pressure	3.33	2.91	2.60	2.35	2.16	1.89	1.66	1.50	1.38	1.29	1.14	1.03	.97
Gallons per minute	44	60	78	99	122	176	240	314	397	490	706	960	1102
Loss Pressure	3.33	3.46	3.62	3.29	3.49	3.94	3.50	3.18	3.71	3.45	3.80	3.47	3.33
No. of Gallons per minute	44	66	94	119	159	264	360	471	675	832	1342	1822	2100
Loss Pressure	11.77	10.35	9.24	8.41	7.73	10.17	9.11	8.26	7.64	7.16	12.13	11.11	10.71
No. of Gallons per minute	88.5	120	156.7	198.7	245	441	601	787	990	1222	2475	3367	3857
Inside Dia. of Pipe in inches	16	17	18	19	20	22	24	26	28	30	....	....	....
Loss Pressure	3.53	3.42	3.32	3.23	3.15	3.62	3.48	3.37	3.27	3.18	....	....	....
No. of Gallons per minute	2512	2835	3180	3540	3922	5227	6217	7297	8467	9720	....	....	....

TEMPERATURE OF AIR WHEN COMPRESSED.

As air is compressed, it rises rapidly in temperature, as shown in table:

No. of lbs. compressed to	0	15	30	45	60	75	90	105	120
Temperature of Air at	60°	177°	255°	317°	369°	416°	455°	490°	524°
" " "	90°	212°	294°	362°	417°	465°	507°	545°	580°

LOSS OF AIR PRESSURE THROUGH FRICTION.

A CALCULATION FOR STRAIGHT PIPES 1,000 FEET LONG.

For other lengths the loss varies directly as the length.

Inside Diameter of Pipe in inches.	Loss of Pressure in lbs.	Cubic feet of free air passed per minute when compressed to 60 lbs. above the atmosphere.	Inside Diameter of Pipe in inches.	Loss of Pressure in lbs.	Cubic feet of free air passed per minute when compressed to 60 lbs. above the atmosphere.	Inside Diameter of Pipe in inches.	Loss of Pressure in lbs.	Cubic feet of free air passed per minute when compressed to 60 lbs. above the atmosphere.
3	.046	48	4	.035	86	5	.028	134
	.212	96		.152	172		.135	268
	.488	144		.361	258		.290	402
	.838	193		.628	343		.512	537
	1.317	241		.981	429		.786	671
	1.807	290		1.355	515		1.080	805
	3.351	386		2.512	687		2.049	1,073
				3.927	859		3.146	1,342
6	.023	193	8	.017	343	10	.011	537
	.104	386		.076	687		.061	1,073
	.244	579		.180	1,030		.146	1,610
	.419	772		.314	1,373		.256	2,146
	.650	965		.490	1,717		.393	2,683
	.904	1,158		.678	2,060		.542	3,220
	1.673	1,544		1.256	2,747		1.021	4,293
	2.634	1,931		1.963	3,434		1.573	5,367

Above table represents only the loss by friction in pipe. There is a further loss of about 2 per cent. due to the friction of the air with itself at mouth of pipe when it leaves receiver. This table is calculated from actual experiment.

The resistance is not varied by the pressure, only so far as changes in pressure varies the velocity; it increases as the square of the velocity and directly as the length.

An increase in pipe reduces friction and lowers the velocity of flow required for the same amount of air

EFFICIENCY OF AIR COMPRESSORS.

It is a common practice to use air in drills and like machines at full stroke, hence we append a table of efficiencies of air compressors when the air is used at 60 pounds per square inch, at sea level and at various heights above.

Height in feet above sea level	0	500	1000	1500	2000	3000	4000	5000	6000	7000	8000	9000	10000
Barometer, inches	30	29.42	28.85	28.31	27.78	26.74	25.70	24.73	23.83	22.93	22.04	21.22	20.43
Efficiency of Compressor per Cent	100	98.4	96.9	95.5	94	91.1	88.1	85.9	82.8	80.2	77.5	75.1	72.7

HYDRAULIC INFORMATION.

The daily average of water consumption in twenty-seven leading cities in North America and Europe, gives the following results:

Daily average..52 Gal. per capita.
Washington, D. C., being largest consumer...............158 " " "
Lyons, France, and Berlin, Germany, } being smallest consumers.......... 20 " " "

Manufacturing cities in which the factories depend upon city supply, use more per capita than others. Cities with easily obtainable supply, lax regulations, and numerous fountains, and special reasons for water use, require above the general average for their average supply; while cities with opposite conditions, require less.

The maxium occasional requirement. exclusive of fire purposes, is sometimes more than double the average requirement of a city.

Friction of Water in Pipes.

Friction-loss in pounds pressure per square inch, for each 100 feet of length in different size clean pipes discharging given quantities of water per minute.

Gals. per minute.	SIZES OF PIPES—INSIDE DIAMETER.														
	¾-in	1-in	1¼-in	1½-in	2-in	2½-in	3-in	4-in	6-in	8-in	10-in	12-in	14-in	16-in	18-in
5	3.3	0 84	0.31	0.12											
10	13.0	3.16	1.05	0.47	0.12										
15	28.7	6.98	2.38	0.97											
20	50.4	12.3	4.07	1 66	0.42										
25	78.0	19.0	6.40	2.62		0.21	0.10								
30		27.5	9.15	3.75	0.91										
35		37.0	12.4	5.05											
40		48.0	16.1	6.52	1.60										
45			20.2	8.15											
50			24.9	10.0	2.44	0.81	0.35	0.09							
75			56.1	22.4	5.32	1.80	0.74								
100				39.0	9.46	3.20	1.31	0.33	0.05						
125					14.9	4.89	1.99								
150					21.2	7.0	2.85	0.69	0.10						
175					28.1	9.46	3.85								
200					37.5	12.47	5.02	1.22	0.17						
250						19.66	7.76	1.89	0.26	0.07	0.03	0.01			
300						28.06	11 2	2.66	0.37	0.09	0.04				
350							15.2	3.65	0.50	0.12	0.05	0.02			
400							19.5	4.73	0.65	0.16	0.06				
450							25.0	6.01	0.81	0.20	0.07	0.03			
500							30.8	7.43	0.96	0.25	0.09	0.04	0.017	0.009	0.005
750									2.21	0.53	0.18	0.08			
1000									3.88	0.94	0.32	0.13	0.062	0.036	0.020
1250										1.46	0.49	0.20			
1500										2.09	0.70	0.29	0.135	0.071	0.040
1750											0.95	0.38			
2000											1.23	0.49	0.234	0.123	0.071
2250												0.63			
2500												0.77	0.362	0.188	0.107
3000												1.11	0.515	0.267	0.150
3500													0.697	0.365	0.204
4000													0.910	0.472	0.263
4500														0.593	0.333
5000														0.730	0.408

Table:—Of the velocity and discharge of water through straight, smooth. cylindrical cast iron pipes: with the friction head required for each 100 feet in length; and also the velocity head. Calculated by means of Weisbach's formula. The velocity head remains the same for any length of pipe, being dependent only on the velocity of the water in the pipe. The entry head is equal to half the velocity head.

Velocity in Feet per Second.	Velocity Head in Feet.	DIAMETER PIPE IN INCHES.											
		3		3½		4		4½		5		6	
		Frict'n Head in Ft.	Cubic Ft. per Minute.	Frict'n Head in Ft.	Cubic Ft. per Minute.	Frict'n Head in Ft.	Cubic Pt. Per Minute.	Frict'n Head in Ft.	Cubic Ft. per Minute.	Frict'n Head in Ft.	Cubic Ft. per Minute.	Frict'n Head in Ft.	Cubic. Ft. per Minute.
2.0	.062	.659	5.89	.565	8.02	.494	10.4	.439	13.2	.395	16.3	.329	23.5
2.2	.075	.780	6.48	.669	8.82	.585	11.5	.520	14.6	.468	18.0	.390	25.9
2.4	.090	.911	7.07	.781	9.62	.683	12.5	.607	15.9	.547	19.6	.456	28.2
2.6	.105	1.05	7.65	.901	10.4	.788	13.6	.701	17.2	.631	21.3	.526	30.6
2.8	.122	1.20	8.24	1.03	11.2	.900	14.6	.800	18.5	.720	22.9	.600	32.9
3.0	.140	1.35	8.83	1.16	12.0	1.02	15.7	.905	19.8	.815	24.5	.679	35.3
3.2	.160	1.52	9.42	1.31	12.8	1.14	16.7	1.02	21.2	.915	26.2	.763	37.7
3.4	.180	1.70	10.0	1.46	13.6	1.27	17.8	1.13	22.5	1.02	27.8	.851	40.0
3.6	.202	1.89	10.6	1.62	14.4	1.41	18.8	1.26	23.8	1.13	29.4	.943	42.4
3.8	.225	2.08	11.2	1.78	15.2	1.56	19.9	1.39	25.2	1.25	31.0	1.04	44.7
4.0	.250	2.28	11.8	1.96	16.0	1.71	20.9	1.52	26.5	1.37	32.7	1.14	47.1
4.2	.275	2.49	12.3	2.14	16.8	1.87	22.0	1.66	27.8	1.50	34.3	1.25	49.5
4.4	.302	2.71	12.9	3.33	17.6	2.03	23.0	1.81	29.1	1.63	36.0	1.35	51.8
4.6	.330	2.94	13.5	2.52	18.4	2.21	24.0	1.96	30.4	1.76	37.6	1.47	54.1
4.8	.360	3.18	14.1	2.72	19.2	2.38	25.1	2.12	31.8	1.91	39.2	1.59	56.5
5.0	.390	3.43	14.7	2.91	20.0	2.57	26.2	2.28	33.1	2.05	40.9	1.71	58.9
5.2	.422	3.68	15.3	3.15	20.8	2.76	27.2	2.45	34.4	2.21	42.5	1.84	61.2
5.4	.455	3.94	15.9	3.38	21.6	2.96	28.2	2.63	35.8	2.37	44.2	1.97	63.6
5.6	.490	4.22	16.5	3.61	22.4	3.16	29.3	2.81	37.1	2.53	45.8	2.11	65.9
5.8	.525	4.50	17.1	3.85	23.2	3.37	30.3	3.00	38.4	2.70	47.4	2.25	68.3
6.0	.562	4.78	17.7	4.10	24.0	3.59	31.4	3.19	39.7	2.87	49.1	2.39	70.7
6.2	.600	5.08	18.2	4.36	24.8	3.81	32.4	3.39	41.0	3.05	50.7	2.54	73.0
6.4	.640	5.39	18.8	4.62	25.6	4.04	33.5	3.59	42.4	3.23	52.3	2.69	75.4
6.6	.680	5.70	19.4	4.89	26.4	4.28	34.5	3.80	43.7	3.42	54.0	2.85	77.7
6.8	.722	6.02	20.0	5.16	27.3	4.52	35.6	4.01	45.0	3.61	55.6	3.01	80.1
7.0	.765	6.35	20.6	5.45	28.0	4.77	36.6	4.24	46.4	3.81	57.2	3.18	82.4

Velocity in Feet per Second.	Velocity Head in Feet.	DIAMETER PIPE IN INCHES.											
		7		8		9		10		11		12	
		Frict'n Head in Ft.	Cubic Ft per Minute.	Frict'n Head in Ft.	Cubic Ft. per Minute.	Frict'n Head in Ft.	Cubic Ft. per Minute.	Frict'n Head in Ft.	Cubic Ft. per Minute.	Frict'n Head in Ft.	Cubic Ft. per Minute.	Frict'n Head in Ft.	Cubic Ft. per Minute.
2.0	.062	.282	32.0	.247	41.9	.220	53.0	.198	65.4	.180	79.2	.165	94.2
2.2	.075	.334	35.3	.293	46.1	.260	58.3	.234	72.0	.213	87.1	.195	103.
2.4	.090	.390	38.5	.342	50.2	.304	63.6	.273	78.5	.248	95.0	.228	113.
2.6	.105	.450	41.7	.394	54.4	.350	68.9	.315	85.1	.287	103.	.263	122.
2.8	.122	.514	44.9	.450	58.6	.400	74.2	.360	91.6	.327	111.	.300	132.
3.0	.140	.582	48.1	.509	62.8	.453	79.5	.407	98.2	.370	119	.339	141.
3.2	.160	.654	51.3	.572	67.0	.508	84.8	.458	105.	.416	127.	.381	151.
3.4	.180	.729	54.5	.638	71.2	.567	90.1	.510	111.	.464	134.	.425	160
3.6	.202	.808	57.7	.707	75.4	.629	95.4	.566	118.	.514	142.	.472	169.
3.8	.225	.892	60.9	.780	79.6	.693	101.	.624	124.	.567	150.	.520	179.
4.0	.250	.979	64.1	.856	83.7	.761	106.	.685	131.	.623	158.	.571	188.
4.2	.275	1.07	67.3	.935	87.9	.832	111.	.748	137.	.680	166.	.624	198.
4.4	.302	1.16	70.5	1.02	92.1	.905	116.	.814	144.	.740	174.	.679	207.
4.6	.330	1.26	73.7	1.10	96.3	.981	122.	.883	150.	.803	182.	.736	217.
4.8	.360	1.36	76.9	1.19	100.	1.06	127.	.954	157.	.867	190.	.795	226.
5.0	.390	1.47	80.2	1.28	105.	1.14	132.	1.03	163.	.935	198.	.857	235.
5.2	.422	1.58	83.3	1.38	109.	1.23	138.	1.10	170.	1.00	206	.920	245.
5.4	.455	1.69	86.6	1.48	113.	1.31	143.	1.18	177.	1.07	214.	.986	254.
5.6	.490	1.81	89.8	1.58	117.	1.40	148.	1.26	183.	1.15	222.	1.05	264.
5.8	.525	1.93	93.0	1.68	121.	1.50	154.	1.35	190.	1.22	229.	1.12	273.
6.0	.562	2.05	96.2	1.79	125.	1.59	159.	1.43	196.	1.30	237.	1.19	283.
6.2	.600	2.18	99.4	1.90	130.	1.69	164.	1.52	203.	1.38	245.	1.27	292.
6.4	.640	2.31	102.	2.02	134.	1.79	169.	1.61	209.	1.47	253	1.35	301.
6.6	.680	2.44	106.	2.14	138.	1.90	175.	1.71	216.	1.55	261.	1.42	311.
6.8	.722	2.58	109.	2.26	142.	2.01	180.	1.81	222.	1.64	269.	1.50	320.
7.0	.765	2.72	112.	2.38	146.	2.12	185.	1.90	229.	1.73	277.	1.59	330.

Approximate Discharge of Pipes 100 Feet Long, Under Different Heads in Gallons Per Minute.

Diam. Pipe.	20 Ft.	40 Ft.	60 Ft.	80 Ft.	100 Ft.
⅜ inch.....	1.30	1.84	2.26	2.61	2.91
½ "	2.68	3.78	4.63	5.34	5.98
⅝ "	4.68	6.61	8.09	9.34	10.44
¾ "	7.37	10.42	12.77	14.74	16.48
1 "	15.13	21.40	26.20	30.26	33.83
1¼ "	26.43	37.37	45.77	52.85	59.09
1½ "	41.65	58.96	72.22	83.38	93.23
2 "	86.76	125.11	153.23	176.94	197.82

Amount Water will Pass one-inch Nozzle Pe Minute with a given Pressure.

Press. at Nozzle.	Gals. Discharged per Minute, 1 inch Smooth Nozzle.	Horizontal Distance Forced.	Height Thrown.	Pressure required at pump to co tinually deliver amount water mentioned for the giv Lengths of Hose.			
				100	200	300	400
10	77	49	22	12	15	17	19
20	110	70	43	24	29	33	37
30	134	90	62	36	43	49	55
40	155	109	79	48	57	65	74
50	173	126	94	61	71	82	92
60	189	142	108	73	85	98	111
70	205	156	121	85	100	115	130
80	219	168	131	97	114	131	148
90	232	178	140	109	128	148	167
100	245	186	148	121	143	164	186

The foregoing list will give the approximat amount of water required to attain the result named and the amount of water is figured to pass through smooth Nozzle. The figures given are for the actua discharge of water. The speculative discharge o water is approximately 20 per cent. more than th actual discharge by experience, thus, when 245 gallon of water are actually discharged, the speculativ calculation is 299 gallons, making a difference of 5 gallons.

APPROXIMATE DISCHARGE OF ORIFICE UNDER DIFFERENT HEADS, IN GALLONS PER MINUTE.

Size Orifice.	20 Ft	40 Ft.	60 Ft.	80 Ft.	100 Ft.
⅜ inch....................	11.70	16.30	20.00	23.20	25.90
½ "	20.60	29.60	35.60	41.20	46.10
⅝ "	32.20	45.50	57.70	64.30	72.00
¾ "	46.20	65.50	80.30	92.60	103.70
1 "	82.30	116.50	142.80	164.40	183.60
1¼ "	128.40	182.40	223.20	258.00	288.00
1½ "	184.80	261.60	320.40	370.80	415.20
1¾ "	252.00	256.40	436.80	505.20	565.20
2 "	328.00	465.60	571.20	658.80	738.00

APPROXIMATE CAPACITY OF WATER PIPES IN GALLONS PER MINUTE.

Pipe Diam.	Fall in Inches for Each 100 Feet of Pipe.							
	1	2	3	6	9	12	24	36
3 inch...............	13	19	23	32	40	46	64	79
4 "	27	38	47	66	81	93	131	163
6 "	75	105	129	183	224	258	364	450
8 "	153	216	265	375	469	529	750	923
9 "	205	290	355	508	617	711	1006	1246
10 "	267	378	463	655	803	926	1310	1613
12 "	422	596	730	1033	1273	1468	2076	2554
15 "	740	1021	1282	1818	2224	2464	3617	4467
18 "	1168	1651	2022	2860	3508	4045	5704	7047
24 "	2396	3387	4152	5871	7202	8303	11744	14466
30 "	4187	5920	7252	10257	12580	14504	20516	25215

Dimensions and Capacities of Pipes and Cylinders.
Useful Hydraulic Information.

For 1 Ft. in Length.		
Cubic Ft. also Area in Sq. Ft.	U. S. Gals., 231 Cubic in	Area, Sq. in.
.0003	.0025	.04909
.0005	.004	.0767
.0008	.0057	.11045
.001	.0078	.15033
.0014	.0102	.19635
.0017	.0129	.2485
.0021	.0159	.3068
.0026	.0193	.37122
.0031	.0230	.44179
.0036	.0269	.51849
.0042	.0312	.60132
.0048	.0359	.69029
.0055	.0408	.7854
.0085	.0638	1.2272
.0123	.0918	1.7671
.0167	.1249	2.4053
.0218	.1632	3.1416
.0276	.2066	3.9761
.0341	.2550	4.9087
.0412	.3085	5.9396
.0491	.3672	7.0686
.0576	.4300	8.2958
.0668	.4998	9.6211
.0767	.5738	11.045
.0873	.6528	12.566
.0985	.7369	14.186
.1134	.8263	15.904
.1231	.9206	17.721
.1364	1.020	19.635
.1503	1.125	21.648
.1650	1.234	23.758
.1803	1.349	25.967
.1963	1.469	28.274
.2131	1.594	30.680
.2304	1.724	33.183
.2485	1.859	35.785
.2673	1.999	38.485
.2867	2.145	41.282
.3068	2.295	44.179
.3276	2.45	47.173
.3492	2.611	50.265
.3712	2.777	53.456
.3941	2.948	56.745
.4176	3.125	60.132
.4418	3 305	63.617
.4667	3.491	67.201
.4922	3.682	70.882
.5185	3.879	74.662
.5454	4.08	78.54
.5730	4.286	82.516
.6013	4.498	86.59
.6303	4.715	90.763
.66	4.937	95.033
.6903	5.164	99.402
.7213	5.396	103.87
.7530	5.632	108.43
.7854	5.875	113.1
.8522	6.375	122.72
.9218	6.895	132.73
.994	7.436	143.14
1.069	7.997	153.94
1.147	8.578	165.13
1.227	9.180	176.71
1.310	9 801	188 69
1.396	10.44	201.06
1.485	11.11	213.82
1.576	11.79	226.98
1 670	12.49	240.53
1.768	13.22	254.47
1.867	13.96	268.80

Lbs. Wt. of Water, per 100 Ft. in Pipe.	
Dia. Pipe, in.	Lbs. in 100 Ft.
1¾	104.27
2	136.20
2¼	172.37
2½	212.8
2¾	257.48
3	306.43
3¼	359.63
3½	417.08
3¾	478.8
4	544.76
4¼	614.98
4½	689.46
4¾	768.2
5	851.19
5¾	1125.7
6	1225.7
6½	1438.5
6¾	1551.29
7	1668.33
7½	1915.18
8	2179.04
8½	2459.94
9	2757.85
9½	3072.79
10	3404.76
10½	3753.74
11	4119.75
11½	4502.79
12	4902.85
12½	5319.93
13	5751.01
14	6673.32
15	7660 7
.....	....
.....	....
.....	....

Weight of Water. { 1 U. S. Gallon..............8⅓ Lbs.
1 Cubic Foot.. ....62½ "

1 Gallon contains 231 Cubic Inches.

1 Cubic Foot contains 7½ Gallons, and 1728 Cubic Inches.

Each Nominal **Horse-Power of Boilers** requires 1 cubic foot of water per hour at 60 lbs. steam pressure.

Condensing Engines require 20 to 25 gallons of water to condense the steam evaporated from one gallon of water.

A **"miner's inch"** of water is approximately equal to a supply of 12 gallons per minute. In California, 9 gallons.

The **friction** of water in **pipes** increases with the square of its velocity.

The **capacity** of **pipes** increases with the square of their diameter, thus doubling the diameter increases the capacity four times

To find the **area** of a piston, square the diameter and multiply by .7854.

To find the **pressure** in pounds per **square inch** of a column of water, multiply the height of the column in feet by .434.

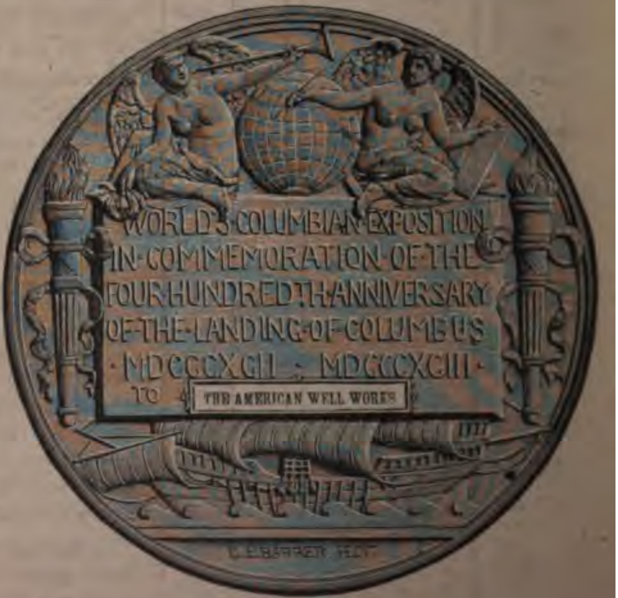
To find **quantity** of **water** elevated in one minute running at 100 feet of piston lift per minute. Square the diameter of the water cylinder in inches and multiply by 4.08. Allowance must be made for slippage.

The area of the Steam Piston multiplied by the steam pressure, gives the total amount of pressure exerted. The area of the Water Piston, multiplied by the pressure of water per square inch, gives the resistance. A margin must be made between the power and the resistance, to move the pistons at the required speed.

To find the **horse-power** required to **elevate water** to a given height, multiply the total weight of the water in pounds by the height in feet and divide the product by 33,000. An allowance should be made for losses by friction and condensation.

Use Air Chamber on long supply pipe; also on discharge pipe for lifts or long delivery.

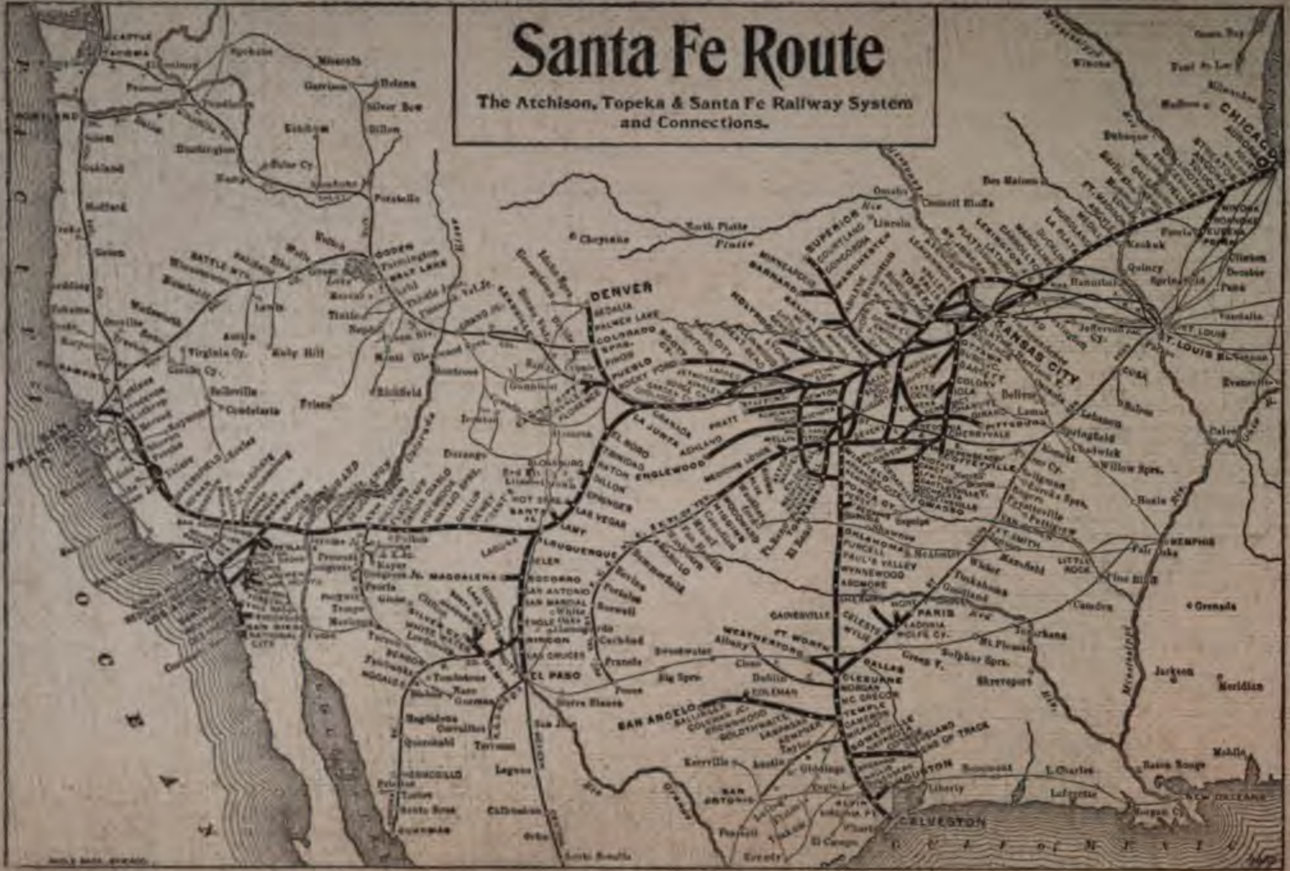
These illustrations represent some of the honors that have been awarded us for the superiority and excellency of our machinery:



4 Highest Medals and 4 Diplomas awarded us at the World's Columbian Exposition, Chicago, 1893.

2 Medals, Industrial Exposition, Kansas City, Mo., 1876.
5 Gold Medals, World's Industrial and Cotton Centennial Exposition, New Orleans, 1884-85.
4 Gold Medals, North Central and South American Exposition, New Orleans 1885-6.
Also, many Diplomas at other State Fairs and Expositions.

For Shippers, Farmers, Miners and Manufacturers the Santa Fe Route Offers Special Inducements



MOST directly reaches the Great Southwest, Kansas, Colorado, Oklahoma, Texas, New Mexico, Arizona and California.

In this region the 1899 crops were bountiful, the mines yielded immense sums, live stock interests flourished, and all kinds of business was profitable.

Everybody made money—some more, some less, but all a fair amount.

The prospects for 1900 are excellent. By locating along the Santa Fe, or doing business with those already there, you get in touch with general prosperity.

For **information about industrial locations,** address J. A. Davis, Industrial Commissioner, A. T. & S. F. Ry., Chicago.

For **information about routing of freight,** address W. B. Biddle, Freight Traffic Manager, A. T. & S. F. Ry., Chicago.

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CHICAGO, ILL., 39 West Randolph St.
DALLAS, TEX.